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Injuries and Accident Causes in Carpentry Operations

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INJURIES AND ACCIDENT CAUSES IN CARPENTRY OPERATIONS

The Injury Record

All available information indicates that the injury-frequency rate 1/ for carpenters is slightly higher than the average for all construction occupations. A somewhat lower than average frequency of fatalities, however, gives carpenters a comparatively favorable injury-severity record.

In 1948, the most recent year for which separate injury rates are available for the various construction operations, carpenters experienced an average of 38.2 disabling injuries in every million employee-hours worked. 2/ The corresponding average for all construction workers in that year was 36.7. The injuries to carpenters produced an average time charge of 106 days per case, representing a time loss of 4.1 days for every 1,000 employee-hours worked. For the construction industry as a whole the comparable averages were 135 days charged per case and 5.0 days lost per 1,000 hours worked.

In comparison with most nonconstruction activities, the carpenters' injury record was less favorable. The all-manufacturing injury-frequency rate in 1948 was only 17.2, less than half the rate for carpenters. 3/ Similarly, the average severity of the injuries experienced by manufacturing workers tended to be much less than for carpenters' injuries. In manufacturing, the average time charge per injury was 83 days and the severity rate was 1.5 in contrast to the carpenters' averages of 106 and 4.1.

1/ The injury-frequency rate is the average number of disabling work injuries for each million employee-hours worked.

A disabling work injury is any injury occurring in the course of and arising out of employment, which (a) results in death or any degree of permanent physical impairment, or (b) makes the injured person unable to perform the duties of any regularly established job open and available to him, throughout the hours corresponding to his regular shift on any day after the day of injury, including Sundays, holidays, and periods of plant shut-down.
See chapter on Scope and Method for further discussion of injury rates and their computation.

2/ Work Injuries in Construction, 1948-49, Bureau of Labor Statistics Bulletin No. 1004.

3/ Work Injuries in the United States During 1948, Bureau of Labor Statistics Bulletin No. 975.

The lack of specific injury data for carpenters in subsequent periods precludes exact comparisons for more recent years. The indications are, however, that the spread between the injury rates for carpenters and for manufacturing workers has widened rather than narrowed. The all-construction injury-frequency rate rose to 39.9 in 1949 and to 41.0 in 1950. Presumably, the carpenters' frequency rate rose proportionately with that of the industry. On the other hand, the all-manufacturing injury-frequency rate dropped sharply to 14.5 in 1949, rising only slightly to 14.7 in 1950. 4/

The 1948 data indicate in detail a considerable variation in the injury experience of carpenters engaged in different types of construction activity. On the whole, the carpenters working for general contractors had higher injury-frequency and severity rates than those working for special-trades contractors. In the general-contracting field, for example, carpenters employed by highway and street contractors had an injury-frequency rate of 55.2; those employed by heavy-engineering and marine contractors had a rate of 44.8; and those employed by general-building contractors had a rate of 37.8.

Scope and Method of Survey

The Bureau of Labor Statistics has compiled annual injury rates for the construction industry as a whole and for each of the three primary types of construction--building, heavy engineering, and highway--each year since 1938. In general, the reports received in the surveys prior to 1948 came from general contractors, although some reports were received from special-trades contractors in each classification.

In 1948 the coverage and detail of the survey were enlarged and injury rates were presented for a wide range of special-trade operations and also in occupational detail. The occupational breakdowns were not continued in subsequent years, but separate injury-rate information was compiled for a number of special-trade contracting operations in both 1949 and 1950. All the data assembled in the injury-rate surveys were collected by mail. Reporting is entirely voluntary.

Injury Rates

The injury-rate comparisons presented in this report are based primarily upon injury-frequency and severity rates compiled under the definitions and procedures specified in the American Standard Method of Compiling Industrial Injury Rates, as approved by the American Standards Association in 1945. These standard rates have been supplemented by an additional measure of injury severity designated as the average time charge per disabling injury. These measures are computed as follows:

4/ Work Injuries in the United States During 1950, Bureau of Labor Statistics Bulletin No. 1098.

Injury-Frequency Rate.--The injury-frequency rate represents the average number of disabling work injuries occurring in each million employee-hours worked. It is computed according to the following formula:

$$\text{Frequency rate} = \frac{\text{Number of disabling injuries multiplied by 1,000,000}}{\text{Number of employee-hours worked}}$$

Average Time Charge Per Disabling Injury.--The relative severity of a temporary injury is measured by the number of calendar days during which the injured person is unable to work at any regularly established job which is open and available to him, excluding the day of injury and the day on which he returns to work. The relative severity of death and permanent impairment cases is determined by reference to a table of economic time charges included in the American Standard Method of Compiling Industrial Injury Rates. These time charges, based upon an average working-life expectancy of 20 years for the entire working population, represent the average percentage of working ability lost as the result of specified impairments, expressed in unproductive days. The average time charge per disabling injury is computed by adding the days lost for each temporary injury and the days charged according to the standard table for each death and permanent impairment and dividing the total by the number of disabling injuries.

Injury-Severity Rate.--The injury-severity rate weights each disabling injury with its corresponding time-loss or time-charge and expresses the aggregate in terms of the average number of days lost or charged per 1,000 employee-hours worked. It is computed according to the following formula:

$$\text{Severity rate} = \frac{\text{Total days lost or charged multiplied by 1,000}}{\text{Number of employee-hours worked}}$$

Accident-Cause Analysis

The individual accident case records collected for this study were obtained from State workmen's compensation files. This represents a deviation from the Bureau's regular practice in similar surveys for other industries in which the data are obtained from the records of individual employers. A basic characteristic of the construction industry dictated this change in the method of data collection. Most firms which employ carpenters are relatively small. Therefore, even though the injury rate is comparatively high, the number of injuries experienced by employees of any one establishment is also small. The number of visits to individual establishments necessary to obtain an adequate volume of case records for analysis, therefore, would have been prohibitive both in terms of time and expense.

Use of the compensation files as the source of the data placed some limitations upon the analysis, particularly in respect to the degree of detail in which the findings could be presented. It is believed, however, that the

greater volume of case records obtained by this collection method compensated in large measure for the lack of additional details which could have been obtained through discussion of the individual cases with the employers, supervisors, or workers who might be acquainted with the unreported circumstances associated with the accidents.

The workmen's compensation agencies of nine States cooperated by making their files available for this survey. These States--Arkansas, California, Colorado, Kentucky, Massachusetts, Missouri, Ohio, Pennsylvania, and West Virginia--constitute a reasonable cross section of the country, insuring the reflection of all possible variations in hazards introduced by differences in climate or construction procedures as well as the differences arising from State safety codes and safety enforcement practices. A total of 9,061 individual accident records was obtained. The primary basis of selection was occupational--the injured person in each instance was either a journeyman carpenter, a carpenter apprentice, a carpenter's helper, or a carpenter supervisor. In the great majority of these cases, the injured person was employed by a general contractor. Included, however, were carpenters employed in many of the special-trade contractors' groups. Maintenance carpenters employed by nonconstruction companies were excluded. The selected cases were taken from the records for the years 1948 and 1949. For each case selected, a Bureau of Labor Statistics representative transcribed from the records, insofar as the data were available, the following items of information: Place where the accident occurred; the work in which the injured was engaged at the time of the accident; the nature of the injury; the part of body injured; and a description of how and why the accident occurred.

The accident-cause analysis procedure used in this study differs in some respects from the procedures specified in the American Standard Method of Compiling Industrial Accident Causes, which are usually followed in the Bureau's studies. The deviations from the standard include the introduction of an additional analysis factor, termed the "agency of injury," and the modification of the standard definitions of some of the other factors in order to permit more accurate cross classifications.

Agency of Injury.--The standard classification provides for the selection of only one "agency" in the analysis of each accident. By definition this agency may be either (a) the object or substance which was unsafe and which thereby contributed to the occurrence of the accident, or (b) in the absence of such an unsafe object or substance, the object or substance most closely related to the injury. Under this definition, therefore, a tabulation of "agencies" for a group of accidents will include objects or substances which may have been inherently safe and unrelated to the occurrence of the accidents, as well as those which led to the occurrence of accidents because of their condition, location, structure, method of use, or other unsafe characteristic. The development of the classification "agency of injury" represents an attempt to separate and classify separately these two agency concepts.

As used in this study, the "agency of injury" is the object, substance, or bodily reaction which actually produced the injury, selected without regard to its safety characteristics or its influence upon the chain of events constituting the accident.

Accident-Type.--As used in this study, the accident-type classification assigned to each accident is purely descriptive of the occurrence which resulted in the injury and is related specifically to the agency of injury. It indicates how the injured person came into contact with or was affected by the previously selected agency of injury. This represents a change from the standard procedure in two respects: First, the accident-type classification is specifically related to the previously selected agency of injury; and second the sequence of selecting this factor is specified.

Hazardous Working Condition.--Under the standard definition, the hazardous working condition indicated in the analysis is defined as the "unsafe mechanical or physical condition of the selected agency which could have been guarded or corrected." This implies the prior selection of the "agency," but does not provide for recognition of any relationship between the unsafe condition and accident-type classifications. Nor does the standard provide for any definite relationship between the "agency" and "accident type" classifications.

To provide continuity and establish direct relationships among the various analysis factors so as to permit cross classification, the standard definition was modified for this study to read: "The unsafe mechanical or physical condition is the hazardous condition which permitted or occasioned the occurrence of the selected accident type." The hazardous-condition classification, therefore, was selected after the determination of the accident-type classification and represents the physical or mechanical reason for the occurrence of that particular accident without regard to the feasibility of guarding or correcting the unsafe condition.

Elimination of the condition "which could have been guarded or corrected" is based upon the premise that statistical analysis should indicate the existence of hazards, but should not attempt to specify the feasibility of corrective measures.

Agency of Accident.--For the purpose of this survey, the agency of accident was defined as the "object, substance, or premises in or about which the hazardous condition existed." Its selection, therefore, is directly associated with the hazardous condition which led to the occurrence of the injury. In many instances the agency of injury and the agency of accident were found to be identical. The double agency classification, however, avoids any possibility of ambiguity in the interpretation of the "agency" tabulations.

Unsafe Act.--The unsafe act definition used in this survey was identical with the standard definition, i. e., "that violation of a commonly accepted safe procedure which resulted in the selected accident type."

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Hazards of the Occupation

In common with most other construction trades, carpenters face many more hazards arising from the work environment than from the specific operations of their trade. The fact that they seldom work for long periods at any one location and the necessity of working in close proximity to other trades which are usually under different supervision contributes greatly to the existence of environmental hazards. Housekeeping problems are particularly difficult to overcome in these circumstances.

On new construction, particularly residential and small commercial jobs, the premises around the structures are frequently muddy, slippery, rutted, cut by open trenches, obstructed by piles of dirt and materials, cluttered with the equipment of many trades, and littered with scrap materials. The possibility of injury from a slip or fall, or from contact with sharp or rough materials arises as soon as the worker enters the construction area. These hazards are intensified by the manual operations involved in the movement of materials and equipment at the job site. Because the materials are frequently heavy, bulky, or awkward to handle, the operation in itself presents considerable possibility for strains, sprains, or other injuries arising from overexertion. The hazardous surfaces over which they must be moved add greatly to these possibilities.

Inside a new structure there are many possibilities of slips, falls, and overexertion due to unfinished floors which are frequently rough, irregular, and cluttered with materials or scrap; unguarded floor openings; open stairways; and rough access ladders. Falling materials, originating in the operations of other trades on the premises as well as in their own, constitute another important hazard for nearly all construction workers.

On many types of construction, carpenters work ahead of the other trades, erecting the structural framework and building the surfaces, platforms, and scaffolds on which the other trades will work. In doing this they frequently must climb on and work from open structural members with little protection from the possibilities of falls.

In repair work carpenters also encounter many hazards arising from poor housekeeping conditions and frequently find it necessary to work in tight and relatively inaccessible quarters. The lack of adequate scaffolds and ladders on repair jobs of short duration frequently leads workers to utilize makeshift methods of reaching elevated positions and results in falls.

The lumber and other materials with which carpenters work are frequently heavy and awkward to handle. In addition, the edges of lumber may be sharp or splintery. As most of these materials must be moved into position by hand, carpenters face the possibility of hand cuts, crushed fingers and toes, and strains and sprains from overexertion.

The hand tools of the trade, many of which have sharp cutting edges, present many hazards when they are mishandled or are not kept in good condition. Portable electric saws, jointers, drills, and other powered tools are frequently used in carpentry operations. In many instances the cutting edges of these tools are inadequately guarded and in field use they are frequently not grounded to prevent electrical shock.

Kinds of Injuries Experienced

The 9,061 disabling injury cases which were examined in detail included 42 fatalities, 6 permanent-total disabilities, 309 permanent-partial disabilities, and 8,704 which were listed as temporary-total disabilities. Some of the last group were still undergoing treatment at the time the records were reviewed and their final classification could not be definitely determined. Presumably, a few of these cases ultimately would develop into fatalities or permanent disabilities.

Fatalities

Skull fractures accounted for 15 of the 42 reported deaths. Twelve of these were the result of falls; 1 resulted from a collision of a truck with a railroad train and another was due to a broken hoist cable which permitted a creosoted pile to fall and strike a workman. For the fifteenth case, no details were available.

Of the 12 falls resulting in skull fractures, 11 were from elevations; 4 of these were from scaffolds. For two of these accidents the records merely indicated that the workmen had fallen from scaffolds. In the third case, a carpenter was killed when a scaffold on which he was working collapsed. The fourth scaffold accident occurred as a carpenter was temporarily operating a hoist, the controls of which were located on the scaffold. Apparently, the carpenter disengaged the brake as he was reaching for the hoisting lever. The cage, carrying a wheelbarrow loaded with concrete, fell about 30 feet before the carpenter could stop it. When he applied the brake, the sudden stop broke a guy wire on the boom of the hoist, permitting the boom to fall. The workman was knocked from the scaffold by the boom and fell 60 feet to the street.

Two carpenters fell from elevations to concrete floors and were killed. In one case the carpenter fell from a ladder on which he had been climbing to a scaffold. As he neared the top of the ladder, he grasped a 2" by 6" scaffold timber. The plank, which had not been nailed, moved and he lost his balance. In the second case a carpenter fell through a floor opening which he had made to permit the erection of a smokestack.

Five other carpenters suffered skull fractures when they fell from elevations. One was knocked from a railroad car by a timber as it was being raised by a hoist. Another lost his balance and fell from a roof as he was handling lumber. A third slipped as he was walking on a steel beam and fell

17 feet to the floor. Still another, standing on a wall tightening bolts on a form, lost his balance and fell to the ground when his wrench slipped. The final accident in this group occurred as a carpenter was walking across a piece of plywood which was being used as a covering for a pit. When the plywood tilted, the carpenter fell into the pit.

The twelfth skull fracture occurred when a carpenter fell over debris on the ground outside a new building. His head struck a surveyor's stake.

Brain concussions accounted for three deaths, in all of which falls were responsible. In one case, a carpenter fell from a roof. In another, the workman fell from a sawhorse and struck a pile of bricks. In the third accident, a carpenter, standing on a wall, was landing steel beams from a crane. After he removed the chains from one of the beams, the boom of the crane struck the beam which turned and knocked him from the wall.

Four carpenters died as a result of strains. In three of these accidents death was actually the result of a heart attack induced by heavy lifting. In the fourth case, a carpenter suffered a hernia when he tried to move a dolly which had stopped and settled in a soft spot of the pavement.

Three carpenters were electrocuted--one by a short circuit in a drill and two by direct contact with electric power transmission lines. Of the latter two accidents, one occurred when a carpenter touched a "live wire" as he was nailing sheeting to the gable of a house. In the other, a carpenter contacted an 11,000-volt power line while he was using a hand line to lift material to a scaffold.

An apprentice carpenter was impaled on half-inch reinforcing steel. While he was working from a plank which had been placed across two steel girders, the plank slipped and he fell 38 feet onto the steel. One fatal injury was due to heat prostration and another was attributed to an occupational disease contracted while the carpenter was working with creosoted lumber.

Four seemingly minor injuries resulted in death. In one case, a workman tripped when his trousers caught on a board. He died 2 days later from internal injuries which he experienced while trying to maintain his balance. In the second accident, a carpenter fell into a hole and bruised his head and trunk. He returned to work but sometime later a malignant tumor developed which caused his death. Two workmen died as a result of infections of puncture wounds to hands. Splinters were responsible for both of these injuries.

Six of the fatal injuries were general in nature. Falls from elevations accounted for four of these and traffic accidents for the other two. Of the falls, two were from scaffolds and two from roofs of buildings.

Permanent-Total Disabilities

Three of the six permanent-total disability cases were back injuries and two were head injuries. The sixth was a multiple-fracture case. In this accident, a staging collapsed, crushing a carpenter in it.

Two of the back injuries did not at first appear to be serious--one, a strain, occurred when a carpenter twisted his back as he tripped over a level; the other, a bruise, resulted when a workman was struck by a drift pin which fell on him. The third back injury, a severe fracture, was due to a fall from a scaffold.

The two head injuries were a fractured skull and a brain concussion. In the first accident, a staging tipped, causing the carpenter to fall to the ground. In the second accident, a descending elevator cage struck the workman's head.

Permanent-Partial Disabilities

The 309 permanent-partial disabilities included 225 amputations, 5 enucleations, and 79 cases involving the loss of use of a body part or function.

Thumbs or fingers were involved in all but three of the amputations which were divided as follows:

Thumb.....	34
1 finger.....	148
2 fingers.....	29
3 fingers.....	6
4 fingers.....	3
Thumb and 1 finger..	2
Great toe.....	1
1 toe (not great)...	2
Total.....	225

Of the 222 finger and thumb amputations, 117 resulted from contact with powered saws and 81 with jointers. About half the injuries attributed to saws resulted from contact with portable electric saws.

Shapers were responsible for two permanent finger injuries and four men were permanently disabled by hoisting equipment--two had their fingers caught in the buckets of cranes, one was caught on a chain, and another in a pulley. Two carpenters suffered finger amputations in connection with the use of motor vehicles. In one case, the workman tried to repair a truck and had his finger amputated by the fan. In the second instance, the vehicle fell from a jack as the carpenter was changing a tire.

Hand tools produced six finger or thumb amputations; hatchets were responsible for three, hand saws for two, and a sledge for the other. Lumber

contributed to five amputations. Two men were disabled when timbers toppled over on their hands, one permitted a piece of lumber to slip from his hands and fall on his finger, one had his finger crushed under a timber as he was placing it into position, and another mashed his finger between a wall and a piece of lumber which he was passing to a co-worker.

Three amputations were attributed to doors. In one case the door closed on a workman's finger as he was fitting it, and in another the spring on a garage door broke as an employee was hanging the door. His finger was caught and amputated by the door when it fell. In the third accident a carpenter inserted his finger in a small hole of a steel door to close it. As he did so, a sliver of steel punctured his finger. The wound became infected and the employee lost his finger.

Another carpenter guided a steel pile into a casing and lost a finger when it was caught between the pile and the shell of the casing. In another case, a carpenter had a finger amputated when it was crushed by a plasterboard which was blown down by the wind.

Of the three toe amputations, two resulted from contact with electrically powered hand saws. In the third case, the toe was crushed under a steel beam which toppled over.

In one of the enucleation cases, a chip struck a carpenter's eye as he was pounding a piece of steel with a hammer. In the second case, an apprentice, holding a chisel which another workman was striking with a sledge, was struck by a chip which flew from the chisel. Another apprentice lost an eye when a fragment of a nail broke off and struck his eye as he was applying shingles. A carpenter foreman lost an eye when an abrasive wheel broke and a piece penetrated his eye. In the final case, a carpenter was applying baseboard. When his hammer slipped, it shattered the plaster and a chip struck his eye. Infection developed and the removal of the eye followed.

Finger and thumb injuries were the most common of the permanent loss-of-use cases, accounting for 26 of the 79 disabilities in that group. Eyes were involved in 18 loss-of-use cases, legs or feet in 14, backs in 7, and arms or hands in 7. The 79 disabilities were classified by nature of injury as follows:

Cuts, lacerations (mostly eye injuries)	28
Fractures	26
Bruises, contusions	11
Strains, sprains	10
Burns	2
Foreign bodies, n.e.c.	2
	79

Moving objects inflicted 32 of the 79 permanent loss-of-use injuries. Falling objects (building materials, walls, boxes, etc.) produced seven,

including two injuries to legs, and injuries to a hand, a thumb, an eye, and a neck. In addition, an employee who was struck by a falling building-form, suffered permanent injuries to several parts of his body. Flying chips, nails, and other small particles, and thrown objects were responsible for 1 finger and 13 eye disabilities. Eight finger injuries and one eye injury were traced to blows by hand tools and two finger injuries were the result of workmen being struck by powered hand saws.

Falls accounted for 20 permanent loss-of-use injuries. Of these, four foot injuries, four leg injuries, two arm injuries, and one back injury were due to falls from scaffolds. Other falls were responsible for nine permanent injuries, including three general body injuries, two arms, two feet, a finger, and an eye.

Ten permanent disabilities resulted from workmen bumping into or striking against equipment and other objects. Moving parts of powered equipment accounted for eight finger or thumb injuries and one hand injury. The other disability, an eye injury, occurred when a carpenter struck a nail which was projecting from a form.

Six permanent finger or thumb injuries, a foot injury, and a back injury were due to workmen being caught in, on, or between moving objects. Hand tools accounted for two of these injuries and a motor vehicle, a form, a door, an excavation, a tool box, and a tree each accounted for one. Overexertion accidents were responsible for four permanent back injuries and a stumble was responsible for a leg injury. Lime burns accounted for an eye injury, a delayed explosion of dynamite accounted for an ear injury, and a simple body twist accounted for a permanent back injury. The final injury in this group, a general disability, occurred when a carpenter contacted a "live wire" as he was puddling concrete.

Temporary-Total Disabilities

Approximately 32 percent of all temporary-total disabilities were arm, hand, or finger injuries, 28 percent were trunk injuries, 26 percent were leg, foot, or toe injuries, and 10 percent were head injuries. The remainder were general in nature and involved more than one body part.

Fingers were involved in about half of the arm, hand, and finger injuries; hands in one-third; and arms in one-sixth. Cuts, lacerations, and punctures were the most frequent type of injury in each group. Bruised arms and fingers, strained or sprained arms and hands, and fractured hands and fingers were also quite common. Arm, hand, and finger injuries most frequently occurred during hand-tool operations or during the handling of materials and equipment.

Nearly two-thirds of all trunk injuries were strains; about one-tenth were hernias. Most of these injuries occurred while workmen were lifting or carrying materials and were generally the result of overexertion. Back injuries predominated.

Foot injuries were primarily cuts, lacerations, strains, sprains, or fractures. Many of these occurred when workmen dropped material or equipment on their feet as they were lifting, carrying, or placing it. Foot strains or sprains occurred most commonly as a result of slips or stumbles while workmen were moving from one place to another at the job site or as a result of their missteps as they were stepping to or from equipment.

Leg injuries were primarily bruises, strains, cuts, or lacerations. Bruises generally resulted from carpenters striking themselves with their hand tools during hand-tool operations or being struck by objects which they dropped while they were lifting or carrying them. Strained or sprained legs were, for the most part, experienced during lifting or carrying operations. Cut and lacerated legs generally occurred during hand-tool operations, particularly those involving hatchets or powered hand saws.

More than half the head injuries involved eyes. Most of these were minor foreign body cases, although approximately one-third of the eye injuries were cuts or lacerations. Hand-tool operations were the chief source of these injuries. Other head injuries were generally cuts, lacerations, bruises, or concussions.

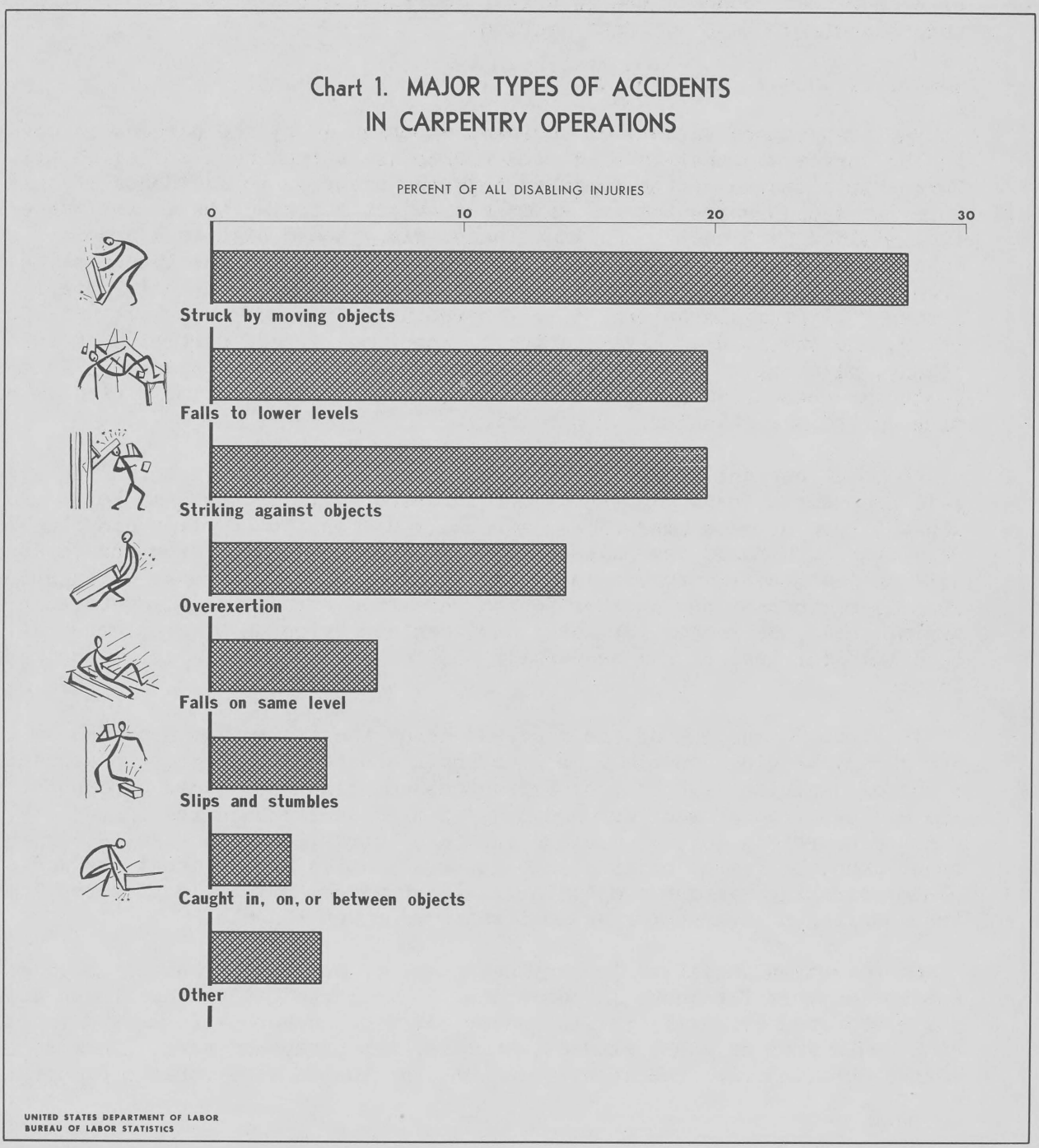
Accident Analysis

Accident reports are frequently deficient in noting all factors relating to accidents. In many instances the only available information comes from the injured person himself, or from witnesses who merely happened to be present at the time and who lack either the skill or the opportunity to investigate the event fully. In the analysis of a large number of cases, therefore, it is common to find a high proportion which lack details, especially in respect to the causes of accidents. This was particularly true of the reports analyzed in this study inasmuch as they were prepared primarily to satisfy the reporting requirements of the various State workmen's compensation boards. In this type of reporting, injury information is stressed much more than accident details.

Despite these limitations, however, the analyst can draw much useful information from even the most sketchy description. Almost invariably an accident description tends to follow the normal line of thinking on the part of an interested person who hears that a friend or acquaintance has been injured. The first thought is of the injury itself. Was it a burn, a cut, a bruise, a strain, or something else? Then, what produced the injury and how did it happen? These are all descriptive facts which are readily apparent to the witnesses. They, therefore, loom large in the accounts of the events. The more analytical question--why did it happen--normally arises only after the desire for descriptive information has been satisfied. It frequently goes unanswered, either because of preoccupation with the descriptive factors, or because the answer may not be readily apparent.

(Insert chart)

Chart 1.--Major types of accidents in carpentry operations



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The direct approach in accident analysis, therefore, is to draw from the records the various elements of information in the order in which they are usually recorded. Standing alone, these elements may have limited value, but when related to each other, they can do much to indicate the accident-prevention activities which may be needed. The determination of the objects or substances which most commonly produce injuries, coupled with information as to how they produced the injuries, constitutes the first step toward an understanding of the accident problem.

Manner of Injury (Accident Type)

The most common variety of accident experienced by the carpenters covered in the survey was that in which the worker was struck by a moving object. More than a fourth of the reported injuries occurred in accidents of this nature, in a high percentage of which the object striking the worker was a hand tool wielded by himself. Falling lumber also ranked high as a producer of injuries in this group of accidents. In many instances the lumber slipped from the worker's own hands and fell on his feet. Most commonly, however, the lumber fell from elevations, i. e., structural framework of buildings, forms, roofs, and scaffolds. Flying chips of wood, nails, and particles of stone, cement, plaster, or metal produced a large number of eye injuries. In most instances these flying objects were set in motion by hand tools used in cutting, grinding, chipping, or hammering.

About 20 percent of the recorded accidents were cases in which the workers fell from elevations. Another 7 percent were falls on the same level and about 5 percent were near-falls, generally designated as slips and stumbles. More than a third of the falls from elevations were falls from scaffolds or working platforms; a fourth were from ladders, stairs, or make-shift supports such as sawhorses; and another fourth were from structural elements such as forms, walls, or roofs. Slippery surfaces and tripping hazards were responsible for most of the near-falls and for most of the falls on the same level.

In about 20 percent of the reported cases the injury was produced by the carpenter striking, bumping, or pressing against some object. In descending order of numerical importance, these accidents included cases of contact with the moving parts of machines and powered hand tools; stepping on objects which penetrated, cut, or bruised the feet; striking against splinters which penetrated the flesh; bumping into materials while moving about the workplace; striking against projecting nails or wires, primarily in scrap lumber; and kneeling on or rubbing against sharp or rough objects.

Overexertion in lifting, carrying, pushing, pulling, or wielding objects was responsible for about 14 percent of the reported injuries. These accidents occurred primarily in lifting or carrying lumber or forms and in using hand tools such as axes, sledges, hammers, pry bars, and saws. In most instances the injuries resulting from these accidents were strains or sprains.

Accident Causes

A generally accepted tenet in accident prevention is that every accident may be traced to the existence of some hazardous condition in the working environment; to the commission of an unsafe act by some individual; or to a combination of these two accident-producing factors. Accident analysis consists of identifying these factors in and summarizing the information relating to a number of accidents in order to indicate the kinds of hazards most commonly involved and which thereby warrant the most intensive attention by persons responsible for accident prevention.

Generally, the elimination of hazardous working conditions is solely the responsibility of management. The avoidance of unsafe acts, on the other hand, requires understanding and cooperation by both management and workers. Management must take the lead, however, by providing safety-minded supervision and by making sure that all workers are acquainted with the hazards of their operations and are familiar with the means of overcoming them.

The function of accident analysis is to supply as much information as possible for use in accident prevention--not to assess blame for the occurrence of any accident. The practice, therefore, is not to choose between an unsafe act and a hazardous condition when both are factors in an accident, but rather to indicate both as contributing elements in the occurrence of the accident. Experience indicates that when all accident details are known both an unsafe act and a hazardous condition will be found to have been involved in the great majority of accidents. Moreover, it is usually evident that if either the unsafe act or the hazardous condition had been eliminated the accident probably would not have occurred.

As pointed out previously, the materials available for analysis in this survey were primarily injury reports rather than detailed accident reports. They were almost invariably explicit in indicating the kind of accident which produced the injury, but many failed to indicate the circumstances leading to the accident. About one-third gave no indication of the existence or nonexistence of a hazardous condition and only one in five contained sufficient details to permit adequate conclusions regarding the commission of an unsafe act. In this analysis the distributions of hazardous conditions and of unsafe acts have been based upon the reports which were complete in respect to these details and the incomplete reports have been listed as unclassified. These unclassified items should not be interpreted as representing cases in which no hazardous condition or unsafe act was involved. No conclusions can be drawn from the data as to the proportion of all carpenter accidents that can be ascribed solely to hazardous conditions or solely to unsafe acts.

Hazardous Working Conditions

Expressed in general terms, the hazardous conditions most commonly contributing to carpenters' injuries were: defective agencies, responsible for 37 percent of the accidents; improperly guarded agencies, accounting for 22

percent; and the lack of proper equipment, associated with 20 percent of the accidents. Of somewhat lesser prominence, unsafe working procedures accounted for 10 percent of the accidents, and poor housekeeping and the lack of necessary personal protective equipment were each responsible for 4 percent.

Defective Agencies.--The most common hazard in the defective agency group consisted of projecting nails or wires in scrap lumber or in structural members. In about two-thirds of the cases attributed to this hazard the injury occurred when the carpenter stepped on the projecting nail or wire. Most of the others were cases of striking against projecting nails or wires while placing materials in position.

Materials of inadequate strength for the purpose used were responsible for nearly as many accidents as were projecting nails and wires. A high percentage of these were cases in which scaffolds, ladders, and forms collapsed under load because of defects in the materials used in their construction. Nails which broke and flew while being driven and hand tools or materials which shattered or spalled under impact to throw off chips or fragments were the sources of most other accidents in this group.

Scaffolds, apparently composed of adequate materials but which gave way because they had been improperly designed or assembled, were responsible for a considerable volume of falls. Similarly, many carpenters fell when they placed their weight on forms or structural members which had been put in position but not adequately secured. Others, in somewhat fewer numbers, were struck by structural materials which fell because of inadequate nailing or assembly.

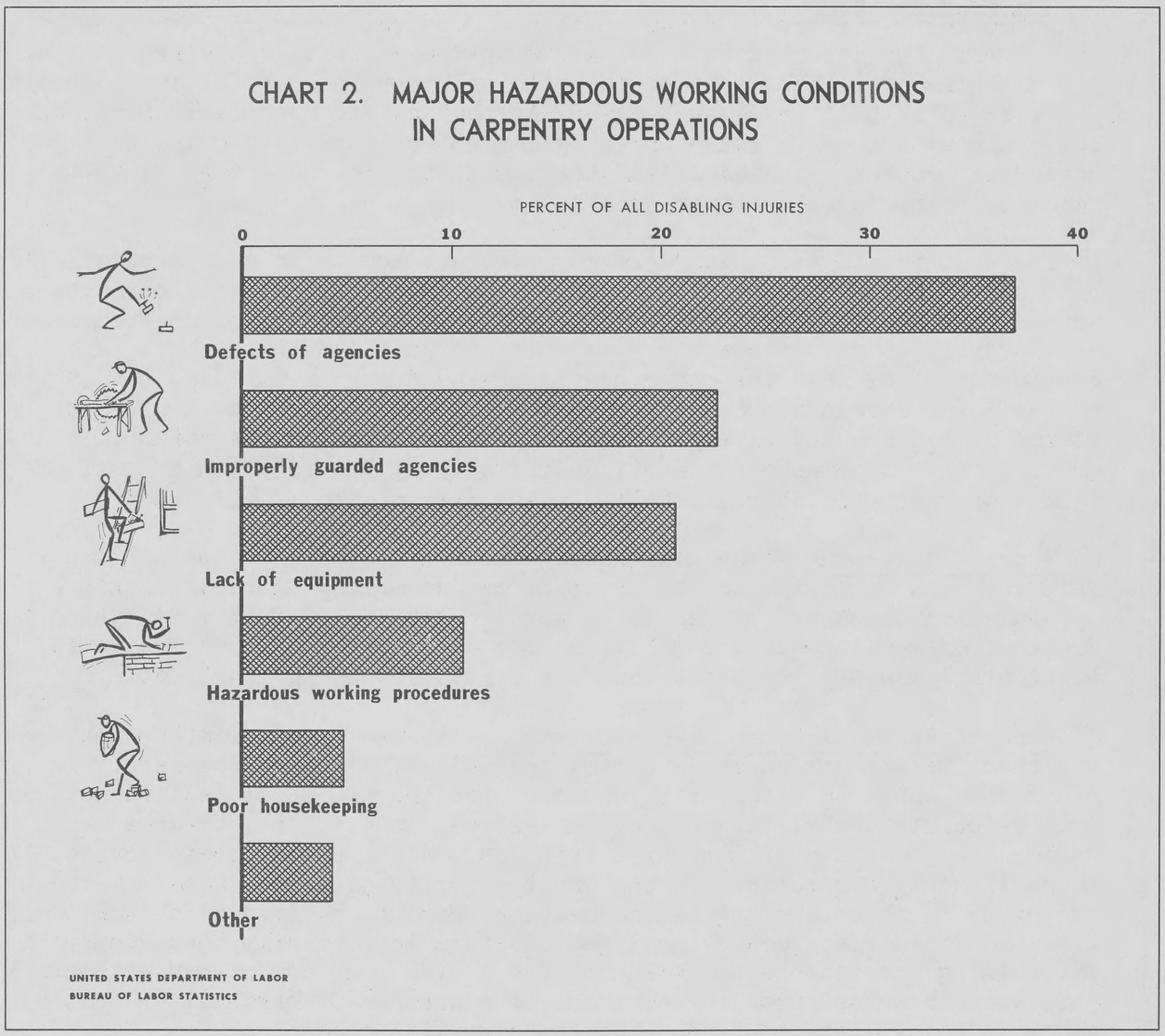
Damaged lumber with sharp and splintery edges and slippery working surfaces were both prolific sources of accidents. The splinter injuries occurred mostly in the course of handling the lumber. The slippery working surfaces occurred principally on the grounds around new structures or on surfaces which were exposed to the weather and resulted primarily in falls or near falls.

Improperly Guarded Agencies.--The hazards in this group consisted primarily of unguarded power equipment and inadequate provision of guard rails and toeboards on scaffolds or around openings in working surfaces. In most instances the unguarded machines were saws, although jointers, sanders, and also grinders were involved in many of these accidents.

The great majority of the accidents attributed to the lack of guard rails were falls, two-thirds of which were from scaffolds or temporary working platforms. The remainder were falls into floor openings or into open trenches and excavations. The accidents which more adequate provision of toeboards would have prevented were all cases in which carpenters were struck by objects falling from scaffolds.

(Insert chart)

Chart 2.--Major types of hazardous working conditions



Lack of Proper Equipment.--Two-thirds of the accidents attributed to this general type of hazard were lifting accidents in which carpenters experienced strains, sprains, or hernias while manually moving heavy materials without sufficient assistance. The remainder were primarily falls, about equally divided between falls from make-shift platforms used as substitutes for non-existent scaffolds and falls resulting from climbing on forms or structural members where no ladders were available.

Hazardous Working Procedures.--Working or walking on open joists or narrow structural members is quite common in construction work. Frequently it is tolerated or accepted as necessary simply because it seems impractical to lay planking over the joists or to build walkways for jobs of short duration. The risk which this entails, however, is obvious because nearly 6 percent of the reported accidents experienced by carpenters were attributed to these hazardous procedures. Nearly all the resulting accidents were falls--the majority being falls to lower levels.

The practice of assigning work at different levels in open structures is also common in construction operations. In large measure this circumstance arises from the fact that the different crafts generally operate under separate supervision and frequently have their tasks scheduled without particular consideration of what the other crafts may be doing at the same time. Workers on the lower levels are thereby directly exposed to the hazard of being struck by falling materials originating in the overhead operations. Accidents of this type were not particularly common, but occurred in sufficient volume to warrant closer attention to the elimination of this hazard.

Poor Housekeeping.--The designation "poor housekeeping" was applied in this analysis primarily to the tripping and stumbling hazards created by the accumulation of scrap and debris on working surfaces. This very common hazard in construction was a prolific source of injury-producing accidents, particularly on the grounds around the structures being constructed.

Lack of Personal Protective Equipment.--The use of personal protective equipment is not common in carpentry operations, although the record is replete with cases in which it is obvious that the use of protective devices, such as safety shoes, impact goggles, gloves, safety hats, or knee pads, would have prevented or minimized injuries. Wider use of these devices is unquestionably desirable. In the great majority of cases, however, the use or nonuse of these devices has no bearing upon the occurrence of the accident itself. Therefore, because accident analysis is primarily concerned with determining the factors which led to the accident as contrasted with the injury which resulted from the accident, the absence of personal protective devices is seldom indicated as a hazardous working condition.

There are, however, certain types of operations performed by carpenters which can be performed safely only through the use of proper protective equipment. Typical operations in this category include the use of power grinders to dress or sharpen tools and the breaking, chipping, drilling, or

hammering of concrete, plaster, stone, or metal. These operations frequently throw off fast-flying chips or particles which can inflict serious eye injuries unless the eyes are protected by a face shield or goggles. In erecting scaffolds, forms, and structural members, carpenters are frequently called upon to work from precarious elevated positions. In these instances the use of life lines and safety belts are essential for the prevention of falls.

Carpenters frequently find it necessary to work in a kneeling position and as a result experience a considerable number of cuts and abrasions on their knees from contact with rough surfaces. Knee pads probably would prevent most of these injuries.

Most of the accidents ascribed to the lack of personal protective equipment in this analysis occurred in operations of the types described above. In about a third of the cases the deficiency was the lack of a safety belt or life line. These were the most serious cases consisting of falls from elevations. In nearly another third it was the lack of knee pads and in about a fifth of the cases the deficiency was the lack of goggles or face shields. The fact that steel-toed safety shoes would have prevented many toe injuries was recognized, but their nonuse was not considered an accident cause.

Unsafe Acts.

For the purpose of this analysis an unsafe act was defined as that violation of a commonly accepted safe procedure which occasioned or permitted the occurrence of the injury-producing accident. Literally, this definition means that no personal action should be designated as unsafe unless there was a reasonable and less hazardous alternative procedure. For example, the use of a ladder which was not equipped with safety shoes when no properly equipped ladder was provided was classified as a hazardous condition and not as an unsafe act. On the other hand, the use of a nail keg or other makeshift platform as a working surface was classified as an unsafe act because other safe means of reaching overhead work were generally available.

The analysis, however, does not imply that the alternative safe procedure was known to the person acting in an unsafe manner, nor that his act was the result of a considered choice between two possible procedures. It was apparent in many instances that the individual knew the safe procedure but knowingly decided not to follow it. In other cases, circumstances indicated that the person acted unsafely simply because he did not know the alternative safe method.

In broad categories, the unsafe acts most commonly found to be responsible for accidents to carpenters were: Assuming an unsafe position or posture, which occurred in 58 percent of the cases; using unsafe equipment or using equipment unsafely, which contributed to the occurrence of 25 percent of the accidents; operating without authority, failure to secure or warn, associated with 11 percent of the accidents; and unsafe loading or placing, which was

responsible for 3 percent.

Assuming an Unsafe Position or Posture.--In general, most of the unsafe acts in this group could be designated as inattention to surroundings. More specifically, in more than 60 percent of the cases in the group the unsafe act consisted of failure to observe the well-known safety admonition "watch your step." Because of the irregular surfaces and poor housekeeping conditions so frequently encountered in the areas where carpenters must work, close and constant attention to footing is a "must" for these workers. The number of missteps into openings or off the edges of scaffolds, platforms, and other elevated surfaces, and the number of trips or stumbles over misplaced materials which should have been quite visible indicates, however, that this precept is frequently forgotten.

A large proportion of the inattention to footing accidents occurred while the workers were simply moving about the work site. Another large group occurred while the workers were lifting or carrying materials. In the latter instances concentration on the work being performed probably was responsible for the inattention to footing. Cases were quite common in which falls resulted from stepping on loose objects while getting down from ladders, descending stairs, or stepping from one surface to another.

Also in the category of inattention to surroundings, many of the reports indicated that the injured workers simply walked into piled materials, posts, or parts of the building in which they were working. Others swung their tools too widely or raised their heads too sharply while working in confined spaces and were injured when they struck against obstructions.

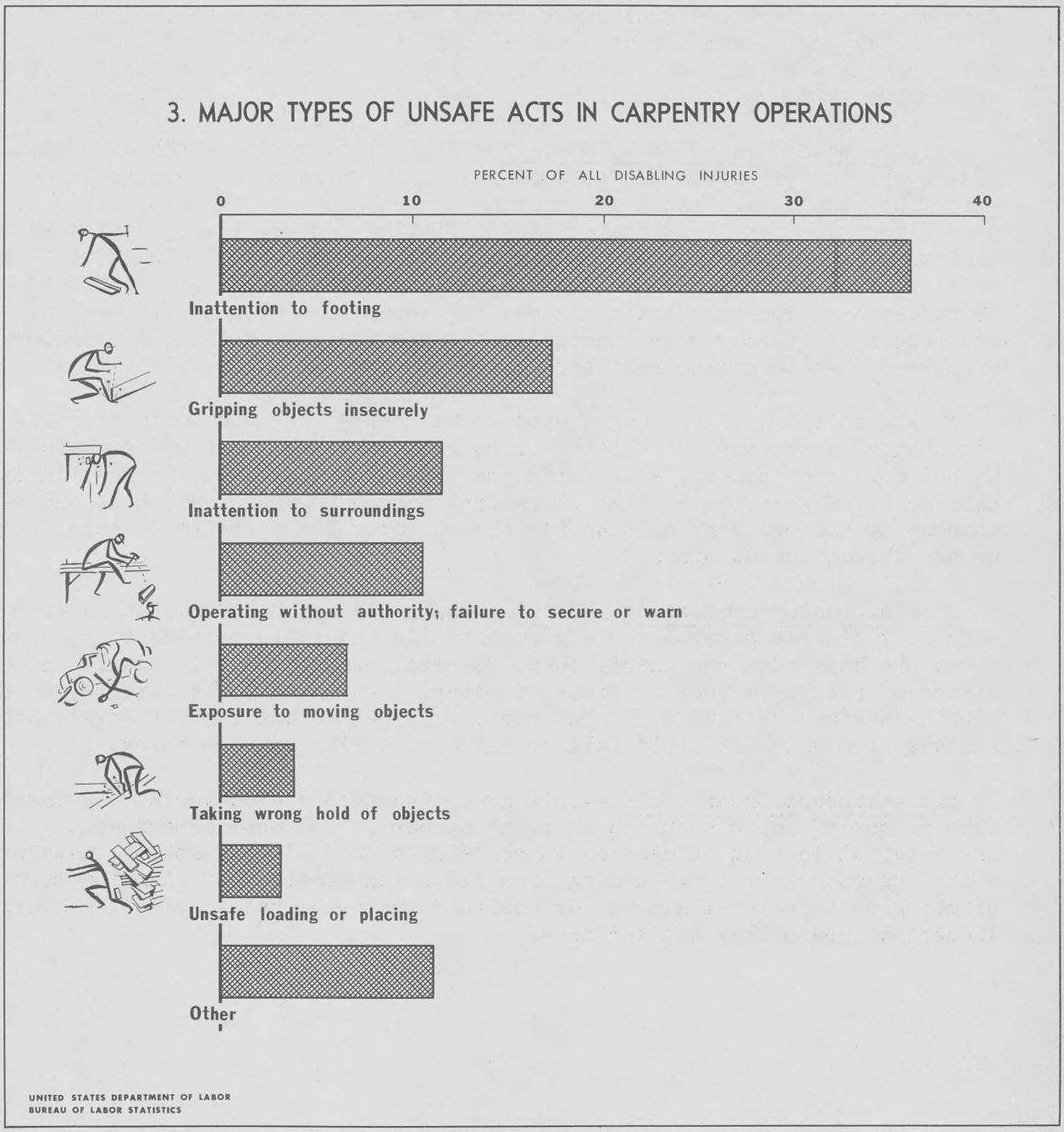
The training of skilled workers usually includes instructions on how to apply the tools of the trade safely, particularly how to avoid contact with edge tools or impact tools if these slip or happen to be misdirected. Nevertheless there were many instances reported in which tools were used in such a manner that when they slipped or glanced from the material they were directed against the worker's body. Of somewhat similar character, a number of cases were reported in which carpenters used their shoulders or other parts of their bodies to support lumber which they were nailing into place and then drove the nails through into their own flesh.

Unnecessary exposure to falling or sliding objects was not a particularly common unsafe act, but occurred frequently enough to warrant some attention. In a number of these cases the injured person had placed himself under a heavy fixture or object to support it while it was being fastened in place. In other instances they unnecessarily entered areas where overhead work was being performed or where scrap materials were being dropped or thrown from overhead.

Incorrect Handling or Unsafe Use of Equipment.--Reflecting the preponderance of manual operations in carpenter work, a large proportion of the accidents were directly related to improper methods of handling tools or materials. In many instances workers dropped objects on their own toes or set objects

(Insert chart)

Chart 3 -- Major types of unsafe acts in carpentry operations



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down on their fingers simply because they had not taken or maintained a proper grip on the materials. In other instances workers were struck by their own hand tools because they were not holding them properly to keep them under control. In some cases the fault lay in attempting to lift objects which were too heavy or bulky for one man to handle or in using one hand instead of two. The misuse or abuse of tools was also a common source of injury. These unsafe practices included procedures such as striking hatchets or hammers with other metal tools, which caused metal chips to fly and inflict eye injuries; using hatchets or wood chisels as pry bars; and using tools of incorrect size or capacity.

Failure to Secure or Warn, Operating Without Authority.--The predominating unsafe act in this group was that of placing materials in positions from which they could fall and leaving them without adequate support. This occurred most frequently in the course of fitting lumber, forms, doors, sash, cabinets, and other millwork. Typically, these were cases in which the cabinets or other objects had been put in final position, but were supported only by wedges or temporary fastenings pending completion of the fitting job. Such fastenings frequently were inadequate to hold the weight and the improperly supported objects pulled away and fell on the worker

In the category of operating without authority, the most common unsafe act was that of carpenters attempting to operate vehicles or power equipment, such as bulldozers or hoists, with which they were not familiar. In most instances this occurred when the regular operator happened to be unavailable, and rather than delay his own work waiting for the operator the carpenter elected to move or use the equipment himself.

Unsafe Loading or Placing.--Most commonly the accidents resulting from unsafe acts of this general variety resulted in injury to persons other than those who committed the unsafe acts. Generally, the specific unsafe act consisted of placing a tool or piece of material on an unstable surface, on a sloping surface such as a pitched roof, or close to the edge of an elevated surface from which it could fall or slide to strike someone below.

Miscellaneous Unsafe Acts.--This group included a wide variety of unsafe acts no one of which occurred in great numbers. The most common were: throwing material instead of passing it or using a hand line; fighting; teasing or startling other workers; jumping from elevations instead of climbing down; and climbing on structural members or scaffold supports instead of using available ladders to reach elevated surfaces.

Accident-Prevention Suggestions

To illustrate the general hazards encountered by carpenters, a number of typical accidents were selected for special analysis. These accidents were analyzed by a member of the Division of Safety Standards in the Bureau of Labor Standards of the United States Department of Labor and suggestions were made to indicate how they might have been prevented.

The purpose of this portion of the report is not to make all-inclusive recommendations, nor to propound authoritative safety rules, but rather to point out that there is a simple approach to the prevention of nearly every accident. Many safety engineers, no doubt, would attack the problems involved in these accidents in different ways and would achieve equally good results. The method of prevention, however, is of little importance as long as it accomplishes its purpose.

Brief descriptions of the accidents with comments and recommendations of the Bureau of Labor Standards' safety specialist are presented on the following pages:

Case Descriptions and Recommendations

1. A carpenter was using a portable electric saw. The blade caught his overalls, which pulled the saw against his leg. Investigation disclosed that the saw was not guarded.

> All powered saws should be adequately guarded. The proper type of guard for a portable saw completely encloses all of the blade not actually in the cut.

2. A carpenter was using a portable electric saw to cut wedges. A piece of wood kicked back and lacerated his left thumb.

> A portable saw should never be used for cutting wedges. Instead, a fixed saw with suitable guides and jigs should be used.

3. A carpenter was using a portable electric saw. When the guard failed to close quickly, the blade lacerated his leg. Investigation disclosed that the guard was clogged with sawdust.

> To be effective, guards of this type must be kept clean and in good working order. Inspection of all equipment should be made frequently and at regular intervals. Defective or unsafe equipment should be repaired or corrected immediately or removed from service.

4. A carpenter was using a portable electric saw to cut rafters. While standing on wet ground, he picked up the saw and suffered an electric shock. Investigation disclosed that the saw had not been grounded.

All portable electric-powered tools should be adequately grounded. In addition, they should be inspected periodically to insure safe operating conditions.

5. A carpenter picked up a portable electric saw and tripped over the cord, accidentally closing the switch. He became excited and dropped the saw, which struck his leg. Investigation disclosed that the saw was not guarded.

(a) Portable electric saws should be adequately guarded to prevent accidental contact with the blade.

(b) Workmen should be carefully trained in the safe use of all tools. In this case, he should have placed the saw in a position where it would not present a tripping hazard when it was not being used.

6. An employee was cutting a 2" x 6" rafter with a portable electric circular saw. When he had finished his cut, he shut off the power and dropped his hand with the saw to his side. The still-moving blade cut a deep gash in his leg. Investigation disclosed that the guard had been removed from the saw several days before and had not been replaced.

Employees should not be permitted to use any equipment without the safeguards which have been provided. Adequate supervision should be maintained to enforce this rule.

7. While a helper was breaking concrete with a hammer and chisel, a piece of concrete lodged in his eye. Investigation disclosed that no goggles or other eye protective devices were provided.

Suitable eye protection should be provided for this work. Although goggles will protect the eyes, face shields with or without goggles are more desirable.

8. A carpenter was standing on a sawhorse platform installing rock lath on the ceiling. A particle fell from the lath and lodged in his eye. The employee failed to have the particle removed and infection developed.

(a) Eye protection should be provided and worn on all ceiling and other overhead jobs.

(b) Particles which have become lodged in workmen's eyes should be removed as soon as possible, but only by a physician or other qualified person.

9. An employee was using a chisel to cut a bolt. As he struck the chisel, a piece of steel chipped from the head of the chisel and punctured his arm. Investigation disclosed that the head of the chisel was mushroomed.

Maintaining tools in good condition at all times is important in accident prevention. Workmen should be trained to remove defective tools from service until they are repaired or corrected.

10. A carpenter was driving a stake with a sledge. When the stake split, the sledge struck his foot.

All workmen should be carefully trained in the safe use of hand tools. In this case, the carpenter should have placed himself in a position so that when the stake split he would not have been struck by the sledge.

11. An apprentice was holding a stake while it was being driven into the ground by a co-worker. The second employee missed the stake and struck the apprentice's hand.

Close teamwork and adequate instruction will prevent many accidents of this type. The best practice suggests the use of tongs to hold the stake.

12. A carpenter was installing wall brackets. When one of the brackets slipped, the screw driver he was using punctured his left hand.

All employees should be carefully trained in the safe performance of their duties. In this case, the carpenter should have placed his left hand in a position so that it would not have been struck by the screw driver when it was misdirected.

13. A wharf builder was using an adz to shape a post. The adz slipped from the post and struck his foot.

The adz is a highly dangerous tool. Careful training in safe procedures is essential to prevent accidents of this type. In this case, the workman should have stood in a position so that he would not have been struck by the adz when it glanced from the post.

14. An apprentice was cutting rock lath with a pocket knife. The blade closed and caught his finger.

Apprentices should be carefully instructed in the safe performance of their duties. A spring-blade knife should never be used in this work. Instead, a one-piece knife, properly guarded, should be used.

15. A helper was drilling holes in an overhead angle iron. Small particles of steel fell into his eye.

Employees engaged in this work should be furnished protective goggles, and should be required to wear them.

16. A carpenter was using a pair of pliers to remove a nail. When the nail loosened suddenly, the force applied to the pliers threw the nail, which struck the carpenter's eye.

Thorough instruction in the safe method of using hand tools should be a part of the training given every carpenter. Pliers are not intended for use in removing nails. Instead, a claw hammer or a nail puller should be used.

17. A carpenter was using a hatchet to shape a piece of lumber. The hatchet glanced from the lumber and cut his leg. Investigation disclosed that the hatchet was dull.

All workmen should be carefully trained in the safe use of hand tools. In this case the carpenter should have (a) placed himself in such a position that he would not have been struck by the hatchet when it glanced from the lumber, and (b) removed the hatchet from service until it had been properly dressed.

18. An employee was cutting a 2" x 4" with a hand saw. As he started a 45-degree cut, the saw slipped and cut his thumb. Investigation disclosed that the carpenter did not start the cut carefully because of haste.

(a) Carpenters should develop safe working habits in using hand tools. In this case the workman should have drawn the saw slowly and carefully across the board until the cut was started.

(b) Wherever possible, a miter box should be used when sawing at an angle.

19. A carpenter was using a wrecking bar to pry a board. He did not secure a good "bite" on the board and the bar slipped when pressure was applied, smashing his fingers between the bar and the board.

Workmen should be carefully trained in the safe use of hand tools. In this case, full pressure should not have been applied to the bar until the proper "bite" had been secured. A proper stance might have prevented the injury even though the bar slipped.

20. A carpenter was standing on a ladder removing forms from a concrete column. When the bar he was using slipped, he was thrown off balance and fell to the ground. The injured worker stated that he could not get a good "bite" with the bar.

The carpenter's difficulty in getting the proper "bite" with the bar was probably due to his limited position on the ladder. Portable steps or platforms should be provided to give more secure footing.

21. A carpenter was placing tie wires on a form. As he cut a piece of wire it flew up and the end struck him in the eye.

For this type of work plastic face shields or goggles are necessary.

When cutting wire the worker should stand to the left of the cut and should hold the wire with his left hand. The free end of the wire will then spring away from him.

22. A carpenter was constructing an archway in an old building. While he was removing the plaster and lath, some particles of plaster lodged in his eyes.

Goggles or face shields should be provided and worn in this work.

23. As a carpenter was climbing a ladder, a rung broke and he fell to the ground. Investigation disclosed that the rung had broken through a knot.

Ladder rungs should be manufactured from knot-free lumber. In this case, an equipment-inspection procedure should have revealed the defect.

24. While a carpenter was descending a fixed ladder, his foot slipped between the rungs of the ladder. Investigation disclosed that the rungs of the ladder were covered with ice.

Under weather conditions where ice may be present, all fixed ladders should be carefully inspected and all ice removed before the ladders are used.

25. A carpenter tried to carry a piece of lumber up a ladder. He lost his balance and fell to the ground.

Employees, climbing ladders, should never attempt to carry lumber or other materials. The material should be passed from one employee to another, or it should be raised by a hand line or by mechanical lifting equipment.

26. A workman was using a ladder to climb a scaffold. When the ladder slipped he fell against a brace on the scaffold. Investigation disclosed that the ladder was not equipped with safety shoes and that the base of the ladder had been placed too far away from the scaffold.

(a) Ladders which are not anchored should be equipped with safety feet.

(b) Workmen should be carefully trained in the safe use of ladders. Generally, ladders should not be placed more than one foot away from the verticle line of support for every 4 feet of height to the support.

27. While a carpenter was grinding the cutting edge of his hatchet, a particle of steel lodged in his eye. Investigation disclosed that the grinder was equipped with a shield but that no goggles or other eye protective devices were available to him.

Some form of eye protection is desirable in nearly all construction work. In grinding operations, such protection is essential. Either goggles or a face shield would have prevented this injury.

28. A carpenter had his thumb amputated in a joiner when the board he was cutting turned and his thumb struck the cutter. Investigation disclosed that the point-of-operation was not guarded.

The point-of-operation of a joiner should be guarded, preferably by a guard which will ride on top of the stock.

29. While a carpenter was using a circular saw, his hand struck the moving saw blade when he attempted to brush some small pieces of wood from the table. Investigation disclosed that the saw blade was not guarded.

(a) Circular saws should be equipped with a hood-type guard.

(b) Workmen using circular saws should be carefully trained in their safe use. A suitable brush should be used to clean the saw table.

30. While a carpenter was cutting a plank on a circular saw, a piece of sawdust lodged in his eye.

Some type of eye protection should be worn on this work. A face shield is preferable for operators of circular saws or other woodworking machines where sawdust or chips are likely to be thrown from the operation. However, for men who perform various types of work, goggles are desirable. Generally, the spectacle type will suffice.

31. A carpenter was adjusting the guide on a circular saw while the saw was running. His hand touched the blade, which amputated a finger.

(a) All circular saws should be equipped with a hood-type guard to prevent accidental contact with the blade.

(b) Adjustments or repairs should never be made on equipment while it is in operation.

32. A roofing contractor was hoisting material to the roof of a building with block and tackle and had roped off the area beneath the tackle. A carpenter dropped his hammer into the roped-off area and entered the area to get it. As he did so, a hammer fell from a bucket being hoisted to the roof and struck him on the head.

(a) Roped-off areas should be entered only after an exchange of signals whereby the hazardous operation would be interrupted.

(b) Construction workers should wear safety hats while they are on the job.

33. While working on a scaffold, a carpenter slipped and fell, thereby injuring his back. Investigation disclosed that spots of ice had formed on the surface of the scaffold.

Scaffolds should be inspected frequently to insure safe condition. Where ice may be present, scaffolds should be inspected before they are used and all ice should be removed or sanded.

34. An employee was standing on a scaffold. One of the scaffold boards broke, throwing the workman to the ground. Investigation disclosed that the 2" x 10" plank split through a large knot.

All lumber used in scaffolds should be inspected before being used and only lumber which is free of large knots should be used for platform planks.

35. A carpenter was working on a scaffold nailing siding to a new building. A second carpenter, working on the roof, dropped his hammer, which struck the first workman on the head.

(a) Whenever practical, work assignments should be planned to avoid anyone having to work in unprotected areas when other operations are being performed overhead. In this case, one of the operations should have been delayed until the other was complete.

(b) All construction workers should wear safety hats while on the job.

36. The scaffold on which a carpenter was working collapsed and he fell to the ground. Investigation disclosed that the scaffold had not been designed to carry the weight imposed upon it.

Scaffolds should be carefully designed for the maximum expected loads, which should not be exceeded.

37. As an apprentice was nailing one end of a 2" x 12" plank to a post, the other end jarred loose and fell. To avoid being hit, the apprentice stepped back and fell from the unguarded scaffold upon which he was working.

(a) Scaffolds should be constructed with guardrails and toeboards.

(b) Sufficient help and adequate supervision should be provided for all operations. In this case, a second workman should have been assigned to hold one end of the plank.

38. Two carpenters were working from an unrailed scaffold. To startle his co-worker, one employee shook the scaffold. The second workman fell from the scaffold.

(a) All scaffolds should be adequately guarded with a rail and toeboard.

(b) Horseplay should be prohibited. Sufficient supervision should be provided to assure the enforcement of this rule.

39. The middle plank of a three-plank scaffold slipped and the workman standing on it fell to the floor. Investigation disclosed that the platform planks had not been nailed.

All platform planks should be securely fastened to prevent their slipping or turning.

40. A carpenter was standing on a bracket scaffold which collapsed and threw him to the ground. Investigation disclosed that the metal bracket holding the scaffold had been nailed to a soft white pine studding and that the traffic on the scaffold had loosened the nails.

Brackets used in scaffolds should be bolted in accordance with the American Safety Standard A 10.2 - 1944, Safety Code for Building Construction.

41. A carpenter who had been working on a scaffold attempted to climb down the scaffold because there was no ladder available. The scaffold lumber was wet and when his foot slipped, he fell to the ground.

Every scaffold assembly should include a ladder or some other means of safe access.

42. A carpenter laid his hammer on a scaffold. Later, when he accidentally kicked it, the hammer fell, striking a second carpenter working under the scaffold. Investigation disclosed that the scaffold did not have a toeboard.

(a) All scaffolds should be equipped with toeboards.

(b) Whenever practical, work assignments should be planned to avoid anyone having to work in unprotected areas when other operations are being performed overhead. In this case, one of the operations should have been delayed until the other was completed.

(c) All workmen should be thoroughly trained to work safely. In this instance, the carpenter should not have placed his hammer where he was likely to strike it with his foot.

43. A carpenter stepped from a sawhorse platform 18 inches high onto a block of wood and twisted his ankle. Investigation disclosed that the floor was littered with discarded scraps of lumber.

(a) Good housekeeping is essential to safety. Before starting work, the supervisor of the crew should make sure that all working surfaces are cleared of loose materials.

(b) Portable steps or platforms with steps are preferable to sawhorse platforms for this type of work.

44. A carpenter stood on a sawhorse, slipped, and fell astride it.

Sawhorses should never be used as working surfaces. Instead, portable steps or a platform should be provided and used for this type of work.

45. A carpenter stood on a sawhorse, stepped off, and twisted his back. Investigation disclosed the sawhorse to be 18 inches high.

Sawhorses should not be used as working surfaces. Instead, portable steps or a platform should be provided and used for this type of work.

46. A carpenter stood on a nail keg, looked up toward his work, tipped the keg, and fell to the floor.

Nail kegs should never be used as working surfaces. Portable steps or stools so designed that they will not tip should be provided.

47. A carpenter was standing on the floor joists while he was nailing a walkway into place. His foot slipped and he fell, straddling a joist.

Workmen should be carefully trained in the safe performance of their duties. In this case, the workman should have nailed the walkway from the walkway itself. If that was not practical, he should have laid a plank across the joists to provide suitable footing.

48. A helper was carrying a sheet of plywood 4' x 8' x 3/8". His vision was blocked by the plywood and he stepped into an opening in the floor and fell. Investigation disclosed that the opening had been made for a hot-air duct.

(a) All floor openings in buildings under construction should be adequately guarded with railings and toeboards or should be covered with planks.

(b) In handling heavy or large objects, two or more workmen should be assigned to the operation.

49. A carpenter, working on the second floor of a new house, fell to the basement through an open stair well.

All floor openings should be adequately guarded with railings and toeboards or should be covered with planks.

50. While carrying a piece of lumber, a carpenter fell to the basement through an unguarded chimney hole.

All floor openings in buildings under construction should be guarded by guard rails and toeboards or covered with planks.

51. A carpenter working on a roof stepped on some wet sap, slipped, and fell off. Investigation disclosed that the contractor had thought a scaffold unnecessary because the pitch of the roof was slight.

Level walkways should be provided for all roof work regardless of the slope of the roof.

52. As a carpenter was setting forms, his foot slipped and he fell against a form, fracturing his rib. Investigation disclosed that the ground was muddy, very slippery, and had a considerable slope.

Before any work is started, safe footing should be provided. This not only reduces the hazard of the work but increases the rate of production.

53. A carpenter was standing on the wall of a foundation setting the first floor joists. As he reached to pick up a joist, he lost his balance and fell from the wall to the ground. Investigation disclosed that the wall was 6 feet high and that no scaffold had been provided.

Foundation walls should not be used as working surfaces. Instead a scaffold or a portable railed platform should be provided.

54. A carpenter was building forms for a concrete bridge. While he was walking on a plank which had been placed between an earthen bank and the bridge footing, the plank turned and he fell, striking the concrete footing. Investigation disclosed that the 10-inch plank had been laid as a walkway over uneven ground.

Provision should be made for safe access to all jobs. In this case, the plank should have been secured so that it would not turn. In addition, elevated walkways should be constructed of two or more planks, cleated together.

55. A helper was carrying a door up a stairway, slipped on a 2" x 4" block, and turned his ankle. When he fell, the door mashed his fingers against the stairway.

Good housekeeping is essential to safety. Each crew should be required to remove its own scrap. Periodic inspections and adequate supervision should be maintained to enforce this rule. Particular attention should be given to keeping stairs free of loose objects.

56. A carpenter was working on the first floor of a new building while other carpenters were placing joists on the second floor. One of the joists fell, striking the carpenter across his back.

Whenever practical, work assignments should be planned to avoid anyone having to work in unprotected areas when other operations are being performed overhead. In this case, one of the operations should have been delayed until the other one was completed.

57. Two carpenters were working on different floors of a new building. The workman on the second floor asked the other workman to throw a chalk box to him. When the first employee failed to catch the box, it fell, striking the second workman on the head.

Materials and other articles should never be thrown. In this case, the chalk box should have been raised on a hand line.

58. A carpenter's helper was moving a large exhaust fan. A piece of bar steel, leaning against a wall, fell and struck him on the head. Investigation disclosed that the steel had been left by ironworkers who had recently completed a contract on the job and that the helper's foot struck the bar as he was moving the fan.

(a) The ironworkers' foreman should have checked the premises to make sure that his crew removed all their materials and scrap before leaving the job.

(b) The carpenter foreman also should have checked the area to see that it was clear for his crew and should have had the bar removed.

(c) The helper himself also should have inspected the area before starting his work in order to spot any possible hazards.

59. A carpenter was dismantling a scaffold and was tossing each piece onto a pile. As he threw a board, a projecting nail scraped his hand.

(a) Nail wounds are a serious hazard in work of this kind. If the lumber is to be reused, all nails should be drawn as each piece is removed. If the lumber is to be discarded, the nails may be bent into the wood.

(b) Gloves should be worn on work of this type.

60. When an apprentice attempted to pull a 2" x 4" from a loose pile of used lumber, the pile shifted and fell against him.

Lumber should be piled in an orderly and stable manner. This not only will reduce the hazard of handling the material but also will save time when it must be moved.

61. A carpenter, carrying a plank, stumbled over a piece of lumber. In trying to regain his balance he stepped on a nail projecting from a piece of scrap lumber.

(a) Good housekeeping is essential for safety. Before starting work, the supervisor of the crew should make sure that all working surfaces are cleared of loose materials and other tripping hazards. In addition, all working crews should be required to remove their own scrap.

(b) It should be standard procedure on all jobs that nails in scrap lumber must be drawn or bent into the wood before any piece is discarded.

62. In walking from one end of a building to the other, a carpenter walked across the open floor joists. As he stepped on one, the nails pulled loose and it turned. The carpenter fell, injuring his back. Investigation disclosed that the joists had just been placed into position and that no walkway had been provided.

Workmen should not be permitted to walk across joists. A railed walkway should be provided.

63. A carpenter was nailing rafters. As he struck a nail, it flew back, striking him in the eye. The employee lost the vision of the eye.

(a) Workmen should start nails carefully by striking them squarely but lightly until they have penetrated the lumber to a depth sufficient to be held securely.

(b) Goggles or other eye protection should be worn on work involving the driving of nails.

64. A carpenter, installing mineral wool insulation, developed an infection on his hands from contact with the mineral wool.

Gloves should be worn in work of this nature.

65. While an apprentice was using the freight elevator, his foot was crushed between the elevator cage and a landing. Investigation disclosed that he was standing near the front of the elevator because of the heavy load being carried and that the door of the cage did not extend to the floor.

According to the American Standard Safety Code for Elevators, Dumbwaiters, and Escalators, Z17.1 - 1937, car gates or doors for freight elevators should guard the full opening, except that they need not be more than 6 feet high.

66. While a carpenter was handling rough framing, a splinter penetrated his finger. Infection developed when he failed to have the splinter removed. Investigation disclosed that no first-aid facilities were available.

(a) Employees who are required to handle rough lumber should be furnished, and required to wear, suitable gloves.

(b) First-aid facilities should be available on every job.

67. A carpenter was nailing rafters. As he attempted to drive a nail, a rafter slipped off the plate. In replacing the rafter, he strained his arm.

Foremen should make sure that adequate help is provided for all operations. In this work, a second employee should be assigned to hold the rafter while it is being nailed. In addition, whenever it is necessary to place heavy rafters by hand, two or more men should be assigned to that work.

68. In placing a 14-foot 2" x 10" joist on the plate, a carpenter's finger was crushed between the joist and the plate.

Thorough instruction in the safe handling of materials should be a part of the training given every carpenter. In this case, the workman should have grasped the joist so that, when he set it down, his fingers would not be crushed.

69. A block and tackle was being used to raise lumber to the roof of a building. The cable broke and the lumber fell, striking a carpenter. Investigation disclosed that the cable was badly frayed.

Cables should be inspected frequently on a regular schedule. Frayed cables should be removed from service immediately.

70. A scaffold builder and a helper were lifting a 12-foot 2" x 12" to a scaffold. The carpenter strained his shoulder. Investigation disclosed that the workmen had tried to lift the plank to a level 7 feet above the ground.

This accident illustrates the importance of proper training and good teamwork in handling lumber. Overhead lifting is likely to cause injury if the proper methods are not used, but trained men can do such work without injury.

71. A carpenter was working from a ladder which was standing on soft ground. The ladder tilted as one foot sank into the ground and the carpenter jumped, fracturing his foot as he struck the ground.

(a) If the ladder had been equipped with safety feet, this accident might not have happened.

(b) If the ladder had been secured at the top, the accident might have been avoided.

(c) If the carpenter had checked the footing of the ladder when he put it in place or had tested its stability before climbing above the first rung, he probably would have discovered the hazard before he was in a position to be injured.

72. A helper on the ground was handing 8-foot 2 x 4's to a carpenter on a scaffold. He released one of the pieces before the carpenter had obtained a good grip on it and it fell on his head.

This was a case of poor teamwork. Coordination of effort is essential for safety whenever two or more persons are working together. One person in the team should signal each move and the others should carefully follow his instructions. In this instance, the carpenter should have called the moves, because he alone could tell when he had control of the material which was being handed to him.

73. An apprentice was using an electric table saw. When the belt slipped from the pulley, he attempted to replace it with his foot. The belt caught his foot, twisting it.

This case involved a number of unsafe conditions and unsafe acts:

(a) Either the pulley or the belt was defective, otherwise the belt would not have slipped off. An adequate equipment inspection program should have revealed this defect and permitted its correction before it caused an accident.

(b) All belt drives should be guarded.

(c) No one should attempt to adjust or replace a drive belt until the power has been cut off and the equipment has come to a complete stop. This rule should be one of the first things taught to an apprentice.

(d) The apprentice should not have used his foot to replace the belt. If the belt was too heavy to place by hand, he should have used a bar.

74. A carpenter was removing forms from a concrete foundation wall. The bank on which he was standing caved in and he fell against the wall.

Safe footing should be provided for all operations. In this case, the bank should have been properly sloped or shored.

APPENDIX: STATISTICAL TABLES

Table 1 - Nature of Disabling Injuries and Parts of Body Injured by Occupation

Nature of injury and part of body injured	Journeymen		Apprentices		Helpers		Superintendents, foremen	
	Number	Percent1/	Number	Percent1/	Number	Percent1/	Number	Percent1/
Total	7,856	100.0	582	100.0	355	100.0	268	100.0
Nature of injury								
Amputations, enucleations	193	2.5	15	2.6	6	1.7	16	6.0
Bruises, contusions	1,550	19.9	115	20.0	88	24.9	50	18.7
Burns, scalds	36	.5	4	.7	3	.8	2	.7
Chemical burns	35	.4	3	.5	1	.3	-	-
Cuts, lacerations, punctures	2,181	28.0	212	36.9	128	36.1	58	21.8
Foreign bodies, N.E.C.	254	3.3	32	5.6	6	1.7	9	3.4
Fractures	1,067	13.7	46	8.0	36	10.2	42	15.7
Hernias	142	1.8	6	1.0	5	1.4	6	2.2
Industrial diseases	29	.4	5	.9	1	.3	3	1.1
Strains, sprains	2,231	28.5	131	22.8	77	21.8	78	29.3
Other	76	1.0	6	1.0	3	.8	3	1.1
Unclassified; insufficient data	62	-	7	-	1	-	1	-
Part of body injured								
Head	779	10.0	72	12.6	32	9.0	25	9.4
Eye	426	5.5	47	8.3	16	4.4	12	4.5
Brain or skull	128	1.6	14	2.4	8	2.3	7	2.6
Other	225	2.9	11	1.9	8	2.3	6	2.3
Trunk	2,195	28.2	99	17.3	91	25.7	76	28.6
Chest, lungs, ribs, etc.	471	6.0	15	2.6	21	5.9	12	4.5
Back	1,156	14.9	49	8.6	47	13.4	40	15.1
Abdomen	199	2.6	7	1.2	9	2.5	8	3.0
Hips or pelvis	88	1.1	6	1.0	4	1.1	3	1.1
Shoulder	248	3.2	17	3.0	9	2.5	11	4.1
Other	33	.4	5	.9	1	.3	2	.8
Upper extremities	2,557	32.8	222	38.7	108	30.5	86	32.3
Arm	405	5.2	28	4.9	22	6.2	17	6.4
Hand	753	9.7	70	12.2	33	9.3	20	7.5
Finger	1,399	17.9	124	21.6	53	15.0	49	18.4
Lower extremities	1,941	24.9	160	27.9	111	31.4	65	24.4
Leg	823	10.6	52	9.1	37	10.5	35	13.1
Foot	972	12.4	91	15.8	68	19.2	25	9.4
Toe	146	1.9	17	3.0	6	1.7	5	1.9
Body, general	317	4.1	20	3.5	12	3.4	14	5.3
Unclassified; insufficient data	67	-	9	-	1	-	2	-

1/ Percents are based on classified cases only.

Table 2 - Nature of Disabling Injuries by Part of Body Injured

Part of body injured	Total number of injuries	Amputations and enucleations	Bruises and contusions	Burns and scalds	Chemical burns	Cuts, lacerations, and punctures	Foreign bodies, N.E.C.	Fractures	Hernias	Industrial diseases	Strains and sprains	Other	Unclassified; insufficient data
Total	9,061	230	1,803	45	39	2,579	301	1,191	159	38	2,517	88	71
Head	908	5	163	6	26	299	301	50	-	2	34	20	2
Eye	501	5	32	2	25	117	300	-	-	1	2	16	1
Brain or skull	157	-	62	-	-	65	-	30	-	-	-	-	-
Other	250	-	69	4	1	117	1	20	-	1	32	4	1
Trunk	2,461	-	386	2	-	34	-	360	159	2	1,508	10	-
Chest, lungs, ribs, etc.	519	-	169	-	-	14	-	251	-	2	78	5	-
Back	1,292	-	96	-	-	2	-	47	-	-	1,147	-	-
Abdomen	223	-	19	-	-	3	-	-	159	-	38	4	-
Hips or pelvis	101	-	33	-	-	6	-	27	-	-	35	-	-
Shoulder	285	-	51	2	-	4	-	25	-	-	203	-	-
Other	41	-	18	-	-	5	-	10	-	-	7	1	-
Upper extremities	2,973	222	440	23	7	1,620	-	364	-	8	283	3	3
Arm	472	-	116	5	2	134	-	98	-	1	113	1	2
Hand	876	-	74	16	4	521	-	113	-	5	141	1	1
Finger	1,625	222	250	2	1	965	-	153	-	2	29	1	-
Lower extremities	2,277	3	600	8	3	600	-	388	-	3	665	4	3
Leg	947	-	377	4	3	196	-	90	-	3	271	2	1
Foot	1,156	-	155	4	-	396	-	209	-	-	390	1	1
Toe	174	3	68	-	-	8	-	89	-	-	4	1	1
Body, general	363	-	213	6	3	22	-	29	-	22	18	50	-
Unclassified; insufficient data	79	-	1	-	-	4	-	-	-	1	9	1	63

Table 3 - Nature of Disabling Injuries by Activity of Injured

Nature of injury	Total number of injuries	Lifting, carrying, or placing	Using hand tools	Using powered tools	Walking	Stepping to or from equipment	Climbing to or from equipment	Running or jumping	Other activities	Unclassified; insufficient data
Total	9,061	2,059	1,531	1,041	485	227	208	47	157	3,306
Amputations, enucleations	230	7	10	203	-	-	-	-	2	8
Bruises, contusions	1,803	275	363	35	92	35	44	8	28	923
Burns, scalds	45	4	7	8	1	-	-	-	9	16
Chemical burns	39	8	4	1	-	-	-	-	4	22
Cuts, lacerations, punctures	2,579	331	659	598	186	26	19	8	29	723
Foreign bodies, N.E.C.	301	4	98	83	-	-	-	-	-	116
Fractures	1,191	176	158	50	66	32	46	6	38	619
Hernias	159	123	5	-	-	2	4	2	5	18
Industrial diseases	38	5	2	1	-	-	-	-	2	28
Strains, sprains	2,517	1,110	219	50	133	132	93	23	34	723
Other	88	4	1	11	2	-	-	-	3	67
Unclassified; insufficient data	71	12	5	1	5	-	2	-	3	43

Table 4 - Parts of Body Injured by Activity of Injured

Part of body injured	Total number of injuries	Lifting, carrying, or placing	Using hand tools	Using powered tools	Walking	Stepping to or from equipment	Climbing to or from equipment	Running or jumping	Other activities	Unclassified; insufficient data
Total	9,061	2,059	1,531	1,041	485	227	208	47	157	3,306
Head	908	63	269	112	22	1	9	1	23	408
Eye	501	10	211	96	5	-	-	1	3	175
Brain or skull	157	17	15	2	10	-	3	-	4	106
Other	250	36	43	14	7	1	6	-	16	127
Trunk	2,461	1,132	189	40	104	60	77	7	37	815
Chest, lungs, ribs, etc	519	95	42	7	45	19	22	-	8	281
Back	1,292	762	108	16	32	23	28	5	12	306
Abdomen	223	155	8	4	3	4	6	2	5	36
Hips or pelvis	101	23	4	2	10	1	6	-	4	51
Shoulder	285	87	25	11	11	9	13	-	6	123
Other	41	10	2	-	3	4	2	-	2	18
Upper extremities	2,973	453	798	772	60	18	32	3	48	789
Arm	472	77	98	25	18	7	13	1	6	227
Hand	876	153	240	112	26	10	13	2	16	304
Finger	1,625	223	460	635	16	1	6	-	26	258
Lower extremities	2,277	363	249	103	277	144	77	33	31	1,000
Leg	947	119	141	74	70	35	32	7	11	458
Foot	1,156	181	88	16	204	109	45	26	14	473
Toe	174	63	20	13	3	-	-	-	6	69
Body, general	363	31	23	10	17	4	10	3	14	251
Unclassified; insufficient data	79	17	3	4	5	-	3	-	4	43

Table 5 - Types of Accidents by Occupation of Injured

Accident types	Journeymen		Apprentices		Helpers		Superintendents, foremen	
	Number	Percent1/	Number	Percent1/	Number	Percent1/	Number	Percent1/
Total	7,856	100.0	582	100.0	355	100.0	268	100.0
Struck by moving objects	2,150	27.6	191	33.0	101	28.5	61	22.8
Falling objects	719	9.3	51	8.8	47	13.3	16	6.0
From hands of workers	252	3.3	18	3.1	18	5.1	4	1.5
From framing or forms	198	2.5	10	1.7	7	2.0	4	1.5
From roofs or scaffolds	71	.9	5	.9	6	1.7	2	.8
From other positions	198	2.6	18	3.1	16	4.5	6	2.2
Flying or thrown objects	588	7.5	57	9.8	21	5.9	20	7.4
Small particles	407	5.2	45	7.8	14	3.9	14	5.1
Lumber	82	1.0	3	.5	1	.3	4	1.5
Nails	52	.7	6	1.0	4	1.1	-	-
Other objects	47	.6	3	.5	2	.6	2	.8
Hand-operated or -wielded objects	539	6.9	65	11.3	21	5.9	12	4.5
Mechanically powered equipment	276	3.5	18	3.1	10	2.8	12	4.5
Other	28	.4	-	-	2	.6	1	.4
Falls to lower levels	1,586	20.3	77	13.3	65	18.3	46	17.3
From scaffolds, platforms, etc.	627	8.0	20	3.5	21	6.0	19	7.1
From forms, walls, roofs, etc.	423	5.4	29	5.0	16	4.5	11	4.1
From ladders, stairs, sawhorses	357	4.6	19	3.3	16	4.5	9	3.4
Through floor openings	41	.5	2	.3	3	.8	2	.8
From other surfaces	138	1.8	7	1.2	9	2.5	5	1.9
Striking against objects	1,493	19.1	138	23.8	83	23.4	59	22.2
Bumping moving parts of equipment	418	5.3	25	4.3	15	4.2	24	9.0
Stepping on objects	281	3.6	48	8.3	33	9.4	5	1.9
Striking splinters or slivers	286	3.6	27	4.7	14	3.9	8	3.0
Bumping building materials	133	1.7	14	2.4	8	2.3	5	1.9
Striking projecting nails, wires	132	1.7	10	1.7	3	.8	3	1.1
Kneeling on or rubbing against	98	1.3	8	1.4	3	.8	6	2.3
Other	145	1.9	6	1.0	7	2.0	8	3.0
Overexertion	1,120	14.3	70	12.1	43	12.1	39	14.7
Due to lifting or carrying	919	11.7	55	9.5	38	10.7	35	13.2
Due to pushing or pulling	124	1.6	10	1.7	4	1.1	3	1.1
Due to swinging objects	59	.8	5	.9	-	-	-	-
Due to other activities	18	.2	-	-	1	.3	1	.4
Falls on same level	527	6.7	26	4.5	23	6.5	19	7.1
As a result of slipping	226	2.8	13	2.2	10	2.8	6	2.2
As a result of tripping	112	1.4	7	1.2	6	1.7	5	1.9
While stepping on loose objects	52	.7	1	.2	1	.3	3	1.1
Other	137	1.8	5	.9	6	1.7	5	1.9
Slips and stumbles (not falls)	359	4.6	19	3.3	13	3.7	20	7.5
Stumbles	185	2.4	12	2.1	6	1.7	13	4.9
Slips	174	2.2	7	1.2	7	2.0	7	2.6
Caught in, on, or between	235	3.0	30	5.2	14	3.9	6	2.3
Handled objects	98	1.3	7	1.2	4	1.1	2	.8
Hand tools and other objects	39	.5	5	.9	3	.8	-	-
Other objects	98	1.2	18	3.1	7	2.0	4	1.5
Absorption of chemicals, poisons	91	1.2	13	2.2	3	.8	5	1.9
Contact with extreme temperatures	47	.6	4	.7	4	1.1	1	.4
Other accident types	204	2.6	11	1.9	6	1.7	10	3.8
Unclassified; insufficient data	44	-	3	-	-	-	2	-

1/ Percents are based on classified cases only.

Table 6 - Accident Types

Accident types	Total		Lumber	Working surfaces	Hand tools	Bodily motions	Chips, splinters	Machines	Forms	Building material N.E.C.
	Number	Percent 1/								
Total	9,061	100.0	2,406	1,728	1,357	576	467	448	335	245
Struck by moving objects	2,503	27.7	637	2	957	-	467	20	38	72
Falling objects	833	9.2	519	2	49	-	-	6	37	67
From hands of workers	292	3.3	175	-	19	-	-	1	19	24
From framing or forms	219	2.4	181	-	8	-	-	-	-	16
From roofs or scaffolds	84	.9	71	-	1	-	-	-	-	8
From other positions	238	2.6	92	2	21	-	-	5	18	19
Flying or thrown objects	686	7.6	90	-	20	-	467	-	-	4
Small particles	480	5.3	-	-	-	-	467	-	-	-
Lumber	90	1.0	90	-	-	-	-	-	-	-
Nails	62	.7	-	-	-	-	-	-	-	-
Other objects	54	.6	-	-	20	-	-	-	-	4
Hand-operated or -wielded objects	637	7.1	16	-	608	-	-	-	1	1
Mechanically powered equipment	316	3.5	-	-	280	-	-	13	-	-
Other	31	.3	12	-	-	-	-	1	-	-
Falls to lower levels	1,774	19.7	70	1,385	8	-	-	-	19	21
From scaffolds, platforms, etc.	687	7.7	26	604	2	-	-	-	2	9
From forms, walls, roofs, etc.	479	5.3	27	376	3	-	-	-	15	7
From ladders, stairs, sawhorses	401	4.4	12	284	2	-	-	-	1	4
Through floor openings	48	.5	2	43	-	-	-	-	-	-
From other surfaces	159	1.8	3	78	1	-	-	-	1	1
Striking against objects	1,773	19.7	830	98	137	-	-	381	79	59
Bumping moving parts of equipment	482	5.4	-	-	103	-	-	378	-	-
Stepping on objects	367	4.1	348	1	-	-	-	-	1	-
Striking splinters or slivers	335	3.7	282	3	2	-	-	-	12	3
Bumping building materials	160	1.8	88	-	-	-	-	-	-	42
Striking projecting nails, wires	148	1.6	100	1	-	-	-	-	36	4
Kneeling on or rubbing against	115	1.3	12	57	13	-	-	-	5	2
Other	166	1.8	-	36	19	-	-	3	25	8
Overexertion	1,272	14.1	582	20	163	-	-	23	142	68
Due to lifting or carrying	1,047	11.6	551	19	21	-	-	19	139	66
Due to pushing or pulling	141	1.6	25	-	76	-	-	4	3	1
Due to swinging objects	64	.7	-	-	64	-	-	-	-	-
Due to other activities	20	.2	6	1	2	-	-	-	-	1
Falls on same level	595	6.6	194	216	17	-	-	6	38	10
As a result of slipping	255	2.9	91	82	8	-	-	1	19	5
As a result of tripping	130	1.4	23	61	4	-	-	1	12	1
While stepping on loose objects	57	.6	13	32	-	-	-	2	-	1
Other	153	1.7	67	41	5	-	-	2	7	3
Slips and stumbles (not falls)	411	4.6	8	1	-	384	-	-	3	1
Stumbles	216	2.4	1	1	-	208	-	-	1	1
Slips	195	2.2	7	-	-	176	-	-	2	-
Caught in, on, or between	285	3.2	70	5	59	-	-	16	16	8
Handled objects	111	1.2	53	-	2	-	-	2	14	6
Hand tools and other objects	47	.5	-	-	47	-	-	-	-	-
Other objects	127	1.5	17	5	10	-	-	14	2	2
Absorption of chemicals, poisons	112	1.2	13	-	-	-	-	-	-	6
Contact with extreme temperatures	56	.6	-	-	1	-	-	-	-	-
Other accident types	231	2.6	-	1	15	192	-	2	-	-
Unclassified; insufficient data	49	-	2	-	-	-	-	-	-	-

1/ Percents are based on classified cases only.

and Agencies of Injury

Accident types	Doors and windows	Building steel	Nails	Vehicles	Boxes and kegs	Chemicals	Excavations	Cabinets, sinks, etc.	Other	Unclassified
Total	168	143	99	90	83	71	70	66	599	110
Struck by moving objects	42	25	76	16	10	-	-	3	135	3
Falling objects	39	21	2	4	10	-	-	3	72	2
From hands of workers	18	10	-	1	8	-	-	1	16	-
From framing or forms	4	1	-	-	-	-	-	-	7	2
From roofs or scaffolds	-	-	-	-	2	-	-	-	2	-
From other positions	17	10	2	3	-	-	-	2	47	-
Flying or thrown objects	-	3	62	-	-	-	-	-	40	-
Small particles	-	-	-	-	-	-	-	-	13	-
Lumber	-	-	-	-	-	-	-	-	-	-
Nails	-	-	62	-	-	-	-	-	-	-
Other objects	-	3	-	-	-	-	-	-	27	-
Hand-operated or -wielded objects	3	1	-	4	-	-	-	-	3	-
Mechanically powered equipment	-	-	-	8	-	-	-	-	15	-
Other	-	-	12	-	-	-	-	-	5	1
Falls to lower levels	4	22	1	3	6	-	64	2	144	25
From scaffolds, platforms, etc.	2	3	-	1	-	-	9	1	26	2
From forms, walls, roofs, etc.	-	11	1	1	1	-	9	-	21	7
From ladders, stairs, sawhorses	2	7	-	-	3	-	1	1	81	3
Through floor openings	-	-	-	-	-	-	-	-	3	-
From other surfaces	-	1	-	1	2	-	45	-	13	13
Striking against objects	32	31	19	4	3	-	-	8	74	18
Bumping moving parts of equipment	-	-	-	1	-	-	-	-	-	-
Stepping on objects	-	-	13	-	-	-	-	-	4	-
Striking splinters or slivers	18	3	1	-	-	-	-	4	7	-
Bumping building materials	-	25	-	-	-	-	-	-	5	-
Striking projecting nails, wires	-	1	-	-	1	-	-	-	5	-
Kneeling on or rubbing against	-	2	-	-	-	-	-	-	16	8
Other	14	-	5	3	2	-	-	4	37	10
Overexertion	64	25	-	23	54	-	-	41	63	4
Due to lifting or carrying	63	20	-	1	52	-	-	41	54	1
Due to pushing or pulling	-	5	-	21	-	-	-	-	6	-
Due to swinging objects	-	-	-	-	-	-	-	-	-	-
Due to other activities	1	-	-	1	2	-	-	-	3	3
Falls on same level	8	21	3	5	3	-	3	4	58	9
As a result of slipping	5	9	2	3	-	-	2	3	22	3
As a result of tripping	1	4	1	1	2	-	1	-	14	4
While stepping on loose objects	1	4	-	-	-	-	-	-	4	-
Other	1	4	-	1	1	-	-	1	18	2
Slips and stumbles (not falls)	2	6	-	1	1	-	-	-	2	2
Stumbles	1	-	-	1	-	-	-	-	-	2
Slips	1	6	-	-	1	-	-	-	2	-
Caught in, on, or between	16	13	-	38	6	-	3	8	27	-
Handled objects	2	12	-	-	5	-	-	7	8	-
Hand tools and other objects	-	-	-	-	-	-	-	-	-	-
Other objects	14	1	-	38	1	-	3	1	19	-
Absorption of chemicals, poisons	-	-	-	-	-	70	-	-	21	2
Contact with extreme temperatures	-	-	-	-	-	-	-	-	55	-
Other accident types	-	-	-	-	-	1	-	-	20	-
Unclassified; insufficient data	-	-	-	-	-	-	-	-	-	47

Table 7 - Types of Accidents by Activity of Injured

Accident types	Total number of injuries	Lifting, carrying, or placing	Using hand tools	Using powered tools	Walking	Stepping to or from equipment	Climbing to or from equipment	Running or jumping	Other activities	Unclassified; insufficient data
Total	9,061	2,059	1,531	1,041	485	227	208	47	157	3,306
Struck by moving objects	2,503	301	990	455	17	4	5	-	42	689
Falling objects	833	267	71	15	9	2	5	-	10	454
From hands of workers	292	198	21	4	1	-	1	-	1	66
From framing or forms	219	16	23	2	4	1	1	-	1	171
From roofs or scaffolds	84	13	4	-	2	-	1	-	-	64
From other positions	238	40	23	9	2	1	2	-	8	153
Flying or thrown objects	686	13	328	154	6	2	-	-	4	179
Small particles	480	4	238	106	-	-	-	-	1	131
Lumber	90	6	16	39	5	-	-	-	-	24
Nails	62	-	58	2	-	-	-	-	-	2
Other objects	54	3	16	7	1	2	-	-	3	22
Hand-operated or -wielded objects	637	13	576	1	-	-	-	-	19	28
Mechanically powered equipment	316	6	2	285	1	-	-	-	6	16
Other	31	2	13	-	1	-	-	-	3	12
Falls to lower levels	1,774	108	144	14	107	53	120	15	18	1,195
From scaffolds, platforms, etc	687	31	62	3	28	18	23	4	6	512
From forms, walls, roofs, etc	479	23	34	7	27	19	35	5	3	326
From ladders, stairs, sawhorses	401	18	40	2	25	12	58	5	3	238
Through floor openings	48	7	-	-	8	-	1	-	-	32
From other surfaces	159	29	8	2	19	4	3	1	6	87
Striking against objects	1,773	285	122	493	167	38	19	28	11	610
Bumping moving parts of equipment	482	1	1	475	1	-	-	-	-	4
Stepping on objects	367	50	5	2	143	25	3	7	-	132
Striking splinters or slivers	335	156	35	6	3	-	-	-	4	131
Bumping building materials	160	27	18	1	11	2	3	2	3	93
Striking projecting nails, wires	148	32	18	1	5	-	3	-	1	88
Kneeling on or rubbing against	115	4	24	4	-	-	-	-	-	83
Other	166	15	21	4	4	11	10	19	3	79

Table 7 - Types of Accidents by Activity of Injured—Continued

Accident types	Total number of injuries	Lifting, carrying, or placing	Using hand tools	Using powered tools	Walking	Stepping to or from equipment	Climbing to or from equipment	Running or jumping	Other activities	Unclassified; insufficient data
Overexertion	1,272	995	136	30	-	-	-	-	25	86
Due to lifting or carrying	1,047	953	15	8	-	-	-	-	-	71
Due to pushing or pulling	141	38	55	20	-	-	-	-	23	5
Due to swinging objects	64	-	63	-	-	-	-	-	-	1
Due to other activities	20	4	3	2	-	-	-	-	2	9
Falls on same level	595	129	39	6	118	29	8	2	7	257
As a result of slipping	255	52	15	3	50	7	5	1	4	118
As a result of tripping	130	32	5	-	39	5	-	1	1	47
While stepping on loose objects	57	12	2	-	17	8	-	-	-	18
Other	153	33	17	3	12	9	3	-	2	74
Slips and stumbles (not falls)	411	124	9	3	70	57	25	2	5	116
Stumbles	216	57	4	3	46	44	7	1	2	52
Slips	195	67	5	-	24	13	18	1	3	64
Caught in, on, or between	285	82	55	17	2	-	1	-	33	95
Handled objects	111	68	3	1	-	-	-	-	1	38
Hand tools and other objects	47	-	45	-	1	-	-	-	-	1
Other objects	127	14	7	16	1	-	1	-	32	56
Absorption of chemicals, poisons	112	16	7	1	-	-	-	-	5	83
Contact with extreme temperatures	56	3	5	2	2	-	-	-	9	35
Other accident types	231	12	22	19	2	46	30	-	1	99
Unclassified; insufficient data	49	4	2	1	-	-	-	-	1	41

Table 8 - Types of Accidents by Location of Accident

Accident types	Total number of injuries	On scaffolds	On ground	On floors	On joists, plates, rafters, etc.	On ladders	On roofs	On walls or forms	On sawhorses	Other and unclassified
Total	9,061	822	623	432	420	361	337	281	142	5,643
Struck by moving objects	2,503	18	67	57	37	5	68	20	6	2,225
Falling objects	833	11	33	12	18	5	12	10	1	731
From hands of workers	292	3	21	4	4	1	5	-	-	254
From framing or forms	219	1	2	6	12	1	-	4	-	193
From roofs or scaffolds	84	7	1	-	1	1	2	-	-	72
From other positions	238	-	9	2	1	2	5	6	1	212
Flying or thrown objects	686	4	10	14	5	-	22	2	1	628
Small particles	480	-	3	8	4	-	14	2	-	449
Lumber	90	2	5	4	-	-	1	-	-	78
Nails	62	-	-	1	-	-	3	-	-	58
Other objects	54	2	2	1	1	-	4	-	1	43
Hand-operated or -wielded objects	637	2	21	26	12	-	18	7	3	548
Mechanically powered equipment	316	1	2	5	2	-	15	-	1	290
Other	31	-	1	-	-	-	1	1	-	28
Falls to lower levels	1,774	677	41	61	184	278	133	156	81	163
From scaffolds, platforms, etc.	687	673	-	-	-	-	2	-	-	12
From forms, walls, roofs, etc.	479	1	-	-	183	1	129	155	-	10
From ladders, stairs, sawhorses	401	2	-	-	-	276	-	-	81	42
Through floor openings	48	-	-	42	-	1	-	-	-	5
From other surfaces	159	1	41	19	1	-	2	1	-	94
Striking against objects	1,773	32	65	113	29	19	38	29	14	1,434
Bumping moving parts of equipment	482	-	-	1	-	3	3	-	2	473
Stepping on objects	367	9	45	24	5	8	3	5	8	260
Striking splinters or slivers	335	4	1	16	4	-	5	4	-	301
Bumping building materials	160	-	5	8	7	1	8	2	2	127
Striking projecting nails, wires	148	2	4	3	1	-	3	5	-	130
Kneeling on or rubbing against	115	2	9	51	7	-	11	4	-	31
Other	166	15	1	10	5	7	5	9	2	112

Table 8 - Types of Accidents by Location of Accident--Continued

Accident types	Total number of injuries	On scaffolds	On ground	On floors	On joists, plates, rafters, etc.	On ladders	On roofs	On walls, or forms	On sawhorses	Other and unclassified
Overexertion	1,272	23	47	25	23	10	23	14	1	1,106
Due to lifting or carrying	1,047	17	32	13	18	10	16	9	1	931
Due to pushing or pulling	141	3	9	5	-	-	6	3	-	115
Due to swinging objects	64	2	6	7	5	-	-	1	-	43
Due to other activities	20	1	-	-	-	-	1	1	-	17
Falls on same level	595	23	184	97	103	3	33	32	5	115
As a result of slipping	255	13	81	25	58	-	19	16	1	42
As a result of tripping	130	6	63	30	3	2	3	8	-	15
While stepping on loose objects	57	-	23	17	5	-	2	1	4	5
Other	153	4	17	25	37	1	9	7	-	53
Slips and stumbles (not falls)	411	21	183	52	23	25	19	16	18	54
Stumbles	216	9	114	39	5	11	1	8	14	15
Slips	195	12	69	13	18	14	18	8	4	39
Caught in, on, or between	285	6	14	6	2	1	3	3	-	250
Handled objects	111	-	2	3	1	1	1	1	-	102
Hand tools and other objects	47	-	2	2	-	-	2	-	-	41
Other objects	127	6	10	1	1	-	-	2	-	107
Absorption of chemicals, poisons	112	-	15	1	2	-	4	-	-	90
Contact with extreme temperatures	56	-	1	1	1	-	5	-	-	48
Other accident types	231	22	6	17	16	20	11	11	17	111
Unclassified; insufficient data	49	-	-	2	-	-	-	-	-	47

Table 9 - Types of Accidents by Hazardous Working Conditions

Accident types	Total number of accidents	Defects of agencies							Improperly guarded agencies				Lack of equipment (not personal)	Hazardous working procedures	Poor housekeeping	Lack of personal safety equipment	Other hazardous conditions	Unclassified
		Total	Projecting nails, wires	Low material strength	Poor design	Projecting slivers	Slippery	Other	Total	Unguarded point-of-operation	Lack of guard rails	Other						
Total	9,061	2,206	528	517	372	329	325	135	1,350	812	382	156	1,232	627	286	251	3	3,106
Struck by moving objects	2,503	258	-	165	57	-	18	18	340	321	10	9	104	125	9	57	-	1,610
Falling objects	833	95	-	33	40	-	16	6	19	-	10	9	84	101	8	-	-	526
From hands of workers	292	19	-	3	-	-	15	1	-	-	-	-	79	9	6	-	-	179
From framing or forms	219	17	-	7	10	-	-	-	5	-	-	5	2	39	-	-	-	156
From roofs or scaffolds	84	16	-	2	14	-	-	-	10	-	10	-	-	20	2	-	-	36
From other positions	238	43	-	21	16	-	1	5	4	-	-	4	3	33	-	-	-	155
Flying or thrown objects	686	128	-	116	5	-	-	7	56	56	-	-	-	8	1	57	-	436
Small particles	480	108	-	103	-	-	-	5	13	13	-	-	-	-	-	57	-	302
Lumber	90	9	-	5	4	-	-	-	43	43	-	-	-	6	1	-	-	31
Nails	62	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	62
Other objects	54	11	-	8	1	-	-	2	-	-	-	-	-	2	-	-	-	41
Hand-wielded objects	637	19	-	12	3	-	2	2	-	-	-	-	19	8	-	-	-	591
Powered equipment	316	15	-	3	9	-	-	3	265	265	-	-	-	8	-	-	-	28
Other	31	1	-	1	-	-	-	-	-	-	-	-	1	-	-	-	-	29
Falls to lower levels	1,774	630	1	315	267	-	42	5	464	-	347	117	205	215	13	87	1	159
From scaffolds, platforms	687	395	-	214	174	-	7	-	255	-	255	-	23	-	4	-	-	10
From forms, walls, roofs	479	155	1	50	85	-	19	-	3	-	2	1	21	207	1	86	-	6
From ladders, stairs, etc	401	59	-	42	6	-	8	3	109	-	-	109	142	3	4	-	-	84
Through floor openings	48	1	-	-	1	-	-	-	46	-	46	-	-	-	-	-	-	1
From other surfaces	159	20	-	9	1	-	8	2	51	-	44	7	19	5	4	1	1	58
Striking against objects	1,773	842	496	7	1	329	1	8	480	477	-	3	12	4	28	91	1	315
Bump moving parts of equipment	482	-	-	-	-	-	-	-	478	476	-	2	1	-	-	-	-	3
Stepping on objects	367	350	350	-	-	-	-	-	-	-	-	-	-	-	17	-	-	-
Striking splinters, slivers	335	332	1	2	-	329	-	-	-	-	-	-	-	-	1	1	-	1
Bumping building materials	160	9	-	4	-	-	1	4	-	-	-	-	-	2	2	11	1	135
Striking projecting nails	148	144	144	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4
Kneeling on or rubbing	115	1	-	-	1	-	-	-	-	-	-	-	4	-	8	77	-	25
Other	166	6	1	1	-	-	-	4	2	1	-	1	7	2	-	2	-	147

Table 9 - Types of Accidents by Hazardous Working Conditions—Continued

Accident types	Total number of accidents	Defects of agencies							Improperly guarded agencies				Lack of equipment (not personal)	Hazardous working procedures	Poor housekeeping	Lack of personal safety equipment	Other hazardous conditions	Unclassified
		Total	Projecting nails, wires	Low material strength	Poor design	Projecting slivers	Slippery	Other	Total	Unguarded point-of-operation	Lack of guard rails	Other						
Overexertion	1,272	22	-	4	8	-	3	7	-	-	-	-	820	-	1	-	-	429
Due to lifting or carrying	1,047	1	-	-	-	-	1	-	-	-	-	-	800	-	-	-	-	246
Due to pushing or pulling	141	17	-	3	5	-	2	7	-	-	-	-	19	-	1	-	-	104
Due to swinging objects	64	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	63
Due to other activities	20	3	-	-	3	-	-	-	-	-	-	-	1	-	-	-	-	16
Falls on same level	595	224	25	18	25	-	137	19	21	3	18	-	11	110	95	-	-	134
As a result of slipping	255	140	3	-	-	-	137	-	1	1	-	-	6	73	1	-	-	34
As a result of tripping	130	38	20	-	2	-	-	16	8	1	7	-	-	5	49	-	-	30
While stepping on loose objects	57	7	-	-	6	-	-	1	-	-	-	-	-	-	45	-	-	5
Other	153	39	2	18	17	-	-	2	12	1	11	-	5	32	-	-	-	65
Slips and stumbles (not falls)	411	170	3	-	-	-	118	49	6	-	6	-	6	30	139	-	-	60
Stumbles	216	50	3	-	-	-	-	47	6	-	6	-	2	-	139	-	-	19
Slips	195	120	-	-	-	-	118	2	-	-	-	-	4	30	-	-	-	41
Caught in, on, or between	285	26	3	5	8	-	6	4	21	4	-	17	19	8	-	-	-	211
Handled objects	111	3	2	-	-	-	1	-	-	-	-	-	13	-	-	-	-	95
Hand tools and other objects	47	4	1	2	-	-	-	1	-	-	-	-	-	-	-	-	-	43
Other objects	127	19	-	3	8	-	5	3	21	4	-	17	6	8	-	-	-	73
Absorption of chemicals	112	2	-	-	-	-	-	2	7	7	-	-	-	80	-	16	-	7
Contact extreme temperatures	56	8	-	2	2	-	-	4	-	-	-	-	-	41	-	-	1	6
Other accident types	231	24	-	1	4	-	-	19	11	-	1	10	55	14	1	-	-	126
Unclassified	49	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	49

Table 10 - Hazardous Working Conditions by Agency of Accident

Hazardous working conditions	Total	Working surfaces	Lumber	Machines	Hand tools	Forms	Framing	Ladders	Roofs	Building materials, N.E.C.	Sawhorses	Chemicals	Walls, foundations	Doors, windows	Excavations	Boxes, kegs	Other	Unclassified
Total	9,061	1,484	1,369	504	568	384	356	237	193	238	98	59	59	56	56	48	246	3,106
Defects of agencies	2,206	757	797	13	119	144	90	42	54	103	6	1	22	28	-	1	61	-
Projecting nails, wires, etc.	528	8	449	-	-	52	-	-	2	4	-	-	10	-	-	1	2	-
Low material strength	517	230	33	-	81	18	24	33	12	48	6	-	5	4	-	-	23	-
Poor design or construction	372	205	-	9	14	46	66	2	10	-	-	-	6	3	-	-	11	-
Projecting slivers	329	3	282	-	1	12	-	-	-	9	-	-	-	18	-	-	4	-
Slippery	325	235	25	-	-	15	-	7	30	4	-	-	1	-	-	-	8	-
Rough or uneven	68	68	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Other defects	67	8	8	4	23	1	-	-	-	6	-	1	-	3	-	-	13	-
Improperly guarded agencies	1,350	333	-	446	379	-	4	117	6	-	-	-	1	-	54	-	10	-
Unguarded point-of-operation	812	-	-	437	375	-	-	-	-	-	-	-	-	-	-	-	-	-
Lack of guard rails, etc.	382	333	-	-	-	-	-	-	6	-	-	-	-	-	41	-	2	-
Other inadequate guarding	156	-	-	9	4	-	4	117	-	-	-	-	1	-	13	-	8	-
Lack of equipment--not personal	1,232	68	482	23	6	163	24	78	7	133	92	-	11	28	2	47	68	-
Lack of lifting equipment	926	18	481	23	2	148	3	12	1	132	1	-	-	28	-	40	37	-
Lack of scaffolds	158	-	1	-	-	-	2	66	1	-	72	-	-	-	-	7	9	-
Lack of ladders	121	46	-	-	-	15	19	-	5	-	19	-	11	-	2	-	4	-
Lack of other equipment	27	4	-	-	4	-	-	-	-	1	-	-	-	-	-	-	18	-
Hazardous working procedures	627	1	88	5	17	71	233	-	23	23	-	53	25	-	-	-	88	-
Inadequate working surfaces	353	-	-	-	-	69	233	-	23	-	-	-	25	-	-	-	3	-
Exposure to falling objects	78	-	59	-	5	-	-	-	-	12	-	-	-	-	-	-	2	-
Other hazardous procedures	196	1	29	5	12	2	-	-	-	11	-	53	-	-	-	-	83	-
Poor housekeeping	286	268	-	-	-	2	-	-	6	-	-	-	-	-	-	-	10	-
Lack of personal safety equipment	251	57	1	17	47	4	5	-	97	10	-	5	-	-	-	-	7	-
Other hazardous conditions	3	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-
Unclassified	3,106	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3,106

Table 11 - Hazardous Working Conditions by Activity of Injured

Hazardous working conditions	Total number of accidents	Lifting, carrying, or placing	Using hand tools	Using powered tools	Walking	Stepping to or from equipment	Climbing to or from equipment	Running or jumping	Other activities	Unclassified; insufficient data
Total	9,061	2,059	1,531	1,041	485	227	208	47	157	3,306
Defects of agencies	2,206	434	266	52	264	83	38	12	46	1,011
Projecting nails, wires, etc.	528	89	24	3	152	26	6	7	1	220
Low material strength	517	21	150	4	15	12	8	-	8	299
Poor design or construction	372	23	28	13	22	20	15	2	9	240
Projecting slivers	329	154	34	6	3	-	-	-	4	128
Slippery	325	111	17	3	57	18	8	-	12	99
Rough or uneven	68	30	2	-	13	7	-	2	2	12
Other defects	67	6	11	23	2	-	1	1	10	13
Improperly guarded agencies	1,350	51	56	807	35	8	22	8	3	360
Unguarded point-of-operation	812	3	1	791	3	-	-	-	-	14
Lack of guard rails, etc.	382	39	35	4	30	5	2	4	1	262
Other inadequate guarding	156	9	20	12	2	3	20	4	2	84
Lack of equipment--not personal	1,232	853	37	4	2	48	77	1	18	192
Lack of lifting equipment	926	849	6	2	-	-	2	-	1	66
Lack of scaffolds	158	3	26	2	-	4	2	-	2	119
Lack of ladders	121	1	-	-	-	43	72	-	-	5
Lack of other equipment	27	-	5	-	2	1	1	1	15	2
Hazardous working procedures	627	67	51	8	34	6	4	2	10	445
Inadequate working surfaces	353	32	32	3	27	6	3	2	2	246
Exposure to falling objects	78	6	5	2	4	-	-	-	-	61
Other hazardous procedures	196	29	14	3	3	-	1	-	8	138
Poor housekeeping	286	65	6	2	74	44	6	1	5	83
Lack of personal safety equipment	251	9	33	46	2	-	1	-	4	156
Other hazardous conditions	3	-	-	-	2	-	-	-	-	1
Unclassified	3,106	580	1,082	122	72	38	60	23	71	1,058

Table 12- Hazardous Working Conditions by Location of Accident

Hazardous working conditions	Total number of accidents	On scaffolds	On ground	On floors	On joists, plates, rafters, etc.	On ladders	On roofs	On walls or forms	On saw-horses	Other and unclassified
Total	9,061	822	623	432	420	361	337	281	142	5,643
Defects of agencies	2,206	438	284	92	99	63	73	102	18	1,037
Projecting nails, wires, etc.	528	12	50	27	5	9	7	18	6	394
Low material strength	517	219	9	12	31	35	18	16	6	171
Poor design or construction	372	186	1	4	52	6	11	42	-	70
Projecting slivers	329	4	-	16	4	-	5	4	-	296
Slippery	325	12	163	29	6	10	30	18	5	52
Rough or uneven	68	2	55	4	1	-	-	4	1	1
Other defects	67	3	6	-	-	3	2	-	-	53
Improperly guarded agencies	1,350	252	49	69	4	119	23	2	2	830
Unguarded point-of-operation	812	1	1	8	4	3	17	-	2	776
Lack of guard rails, etc.	382	249	39	60	-	1	6	-	-	27
Other inadequate guarding	156	2	9	1	-	115	-	2	-	27
Lack of equipment—not personal	1,232	63	35	15	32	80	21	37	94	855
Lack of lifting equipment	926	20	26	14	15	14	16	11	1	809
Lack of scaffolds	158	-	-	-	2	66	-	-	71	19
Lack of ladders	121	43	-	-	15	-	5	25	22	11
Lack of other equipment	27	-	9	1	-	-	-	1	-	16
Hazardous working procedures	627	-	24	8	218	3	44	98	-	232
Inadequate working surfaces	353	-	-	3	214	-	34	96	-	6
Exposure to falling objects	78	-	2	1	1	-	2	-	-	72
Other hazardous procedures	196	-	22	4	3	3	8	2	-	154
Poor housekeeping	286	12	142	74	2	10	3	5	19	19
Lack of personal safety equipment	251	2	7	48	5	-	99	4	-	86
Other hazardous conditions	3	-	-	1	-	-	-	-	-	2
Unclassified	3,106	55	82	125	60	86	74	33	9	2,582

Table 13 - Unsafe Acts by Occupation of Injured

Unsafe acts	Journeymen		Apprentices		Helpers		Superintendents, foremen	
	Number	Percent1/	Number	Percent1/	Number	Percent1/	Number	Percent1/
Total	7,856	100.0	582	100.0	355	100.0	268	100.0
Assuming unsafe positions, postures	994	58.9	54	43.8	29	43.3	47	63.4
Inattention to footing	630	37.3	25	20.3	16	23.9	32	43.0
On ground	216	12.7	10	8.0	7	10.4	17	22.7
On scaffolds or platforms	170	10.1	4	3.3	2	3.0	6	8.1
On floors	133	7.9	6	4.9	4	6.0	6	8.1
On stairways or ladders	70	4.2	1	.8	2	3.0	3	4.1
On other surfaces	41	2.4	4	3.3	1	1.5	-	-
Inattention to surroundings	197	11.7	11	8.9	7	10.4	11	14.9
Exposure to moving objects	111	6.6	10	8.1	3	4.5	3	4.1
Other	56	3.3	8	6.5	3	4.5	1	1.4
Incorrect handling; unsafe use of equipment	399	23.7	43	35.0	23	34.3	15	20.3
Gripping objects insecurely	282	16.8	32	26.1	14	20.8	8	10.8
Taking wrong hold of objects	61	3.6	8	6.5	3	4.5	3	4.1
Other	56	3.3	3	2.4	6	9.0	4	5.4
Operating without authority; failure to secure or warn	178	10.6	12	9.8	7	10.4	7	9.5
Unsafe loading or placing	49	2.9	5	4.1	6	9.0	1	1.4
Other unsafe acts	65	3.9	9	7.3	2	3.0	4	5.4
Unclassified; insufficient data	6,171	-	459	-	288	-	194	-

1/ Percents are based on classified cases only.

Table 14- Unsafe Acts by Types of Accidents

Accident types	Total number of accidents	Assuming unsafe positions or postures					Incorrect handling; unsafe use of equipment				Operating without authority; failure to secure	Unsafe loading or placing	Other unsafe acts	Unclassified; insufficient data
		Total	Inattention to footing	Inattention to surroundings	Exposure to moving objects	Other	Total	Gripping objects insecurely	Taking wrong hold of objects	Other				
Total	9,061	1,124	703	226	127	68	480	336	75	69	204	61	80	7,112
Struck by moving objects	2,503	153	4	3	123	23	360	306	5	49	184	56	18	1,732
Falling objects	833	23	-	3	19	1	176	174	2	-	162	52	2	418
From hands of workers	292	2	-	1	1	-	174	173	1	-	4	1	-	111
From framing or forms	219	12	-	-	12	-	-	-	-	-	80	12	-	115
From roofs or scaffolds	84	-	-	-	-	-	-	-	-	-	27	4	-	53
From other positions	238	9	-	2	6	1	2	1	1	-	51	35	2	139
Flying or thrown objects	686	18	3	-	1	14	43	3	-	40	7	4	11	603
Small particles	480	-	-	-	-	-	38	1	-	37	-	-	-	442
Lumber	90	3	1	-	1	1	-	-	-	-	3	1	7	76
Nails	62	-	-	-	-	-	-	-	-	-	-	-	-	62
Other objects	54	15	2	-	-	13	5	2	-	3	4	3	4	23
Hand-wielded objects	637	92	-	-	92	-	122	113	3	6	8	-	-	415
Powered equipment	316	8	1	-	-	7	18	15	-	3	6	-	2	282
Other	31	12	-	-	11	1	1	1	-	-	1	-	3	14
Falls to lower levels	1,774	321	316	1	-	4	-	-	-	-	-	1	11	1,441
From scaffolds, platforms	687	180	180	-	-	-	-	-	-	-	-	-	6	501
From forms, walls, roofs	479	8	6	-	-	2	-	-	-	-	-	-	-	471
From ladders, stairs, etc	401	51	50	1	-	-	-	-	-	-	-	-	4	346
Through floor openings	48	37	37	-	-	-	-	-	-	-	-	-	-	11
From other surfaces	159	45	43	-	-	2	-	-	-	-	-	-	1	112
Striking against objects	1,773	240	5	221	-	14	22	4	2	16	-	-	30	1,481
Bump moving parts of equipment	482	14	-	1	-	13	11	-	-	11	-	-	15	442
Stepping on objects	367	1	1	-	-	-	-	-	-	-	-	-	-	366
Striking splinters, slivers	335	-	-	-	-	-	-	-	-	-	-	-	-	335
Bumping building materials	160	109	2	107	-	-	1	1	-	-	-	-	2	48
Striking projecting nails	148	2	-	2	-	-	-	-	-	-	-	-	-	146
Kneeling on or rubbing	115	1	1	-	-	-	5	-	1	4	-	-	-	109
Other	166	113	1	111	-	1	5	3	1	1	-	-	13	35

Table 14- Unsafe Acts by Types of Accidents--Continued

Accident types	Total number of accidents	Assuming unsafe positions or postures					Incorrect handling; unsafe use of equipment				Operating without authority; failure to secure	Unsafe loading or placing	Other unsafe acts	Unclassified; insufficient data
		Total	Inattention to footing	Inattention to surroundings	Exposure to moving objects	Other	Total	Gripping objects insecurely	Taking wrong hold of objects	Other				
Overexertion	1,272	3	-	-	-	3	8	3	1	4	3	1	6	1,251
Due to lifting or carrying	1,047	-	-	-	-	-	-	-	-	-	2	1	3	1,041
Due to pushing or pulling	141	3	-	-	-	3	3	2	-	1	-	-	1	134
Due to swinging objects	64	-	-	-	-	-	4	1	1	2	-	-	-	60
Due to other activities	20	-	-	-	-	-	1	-	-	1	1	-	2	16
Falls on same level	595	171	159	-	-	12	-	-	-	-	1	-	2	421
As a result of slipping	255	11	10	-	-	1	-	-	-	-	-	-	-	244
As a result of tripping	130	93	93	-	-	-	-	-	-	-	-	-	1	36
While stepping on loose objects	57	40	39	-	-	1	-	-	-	-	-	-	-	17
Other	153	27	17	-	-	10	-	-	-	-	1	-	1	124
Slips and stumbles (not falls)	411	210	208	-	-	2	-	-	-	-	-	-	-	201
Stumbles	216	191	191	-	-	-	-	-	-	-	-	-	-	25
Slips	195	19	17	-	-	2	-	-	-	-	-	-	-	176
Caught in, on, or between	285	15	2	1	4	8	89	22	67	-	16	3	11	151
Handled objects	111	4	-	-	3	1	62	6	56	-	2	1	3	39
Hand tools and other objects	47	1	-	1	-	-	15	12	3	-	-	-	-	31
Other objects	127	10	2	-	1	7	12	4	8	-	14	2	8	81
Absorption of chemicals	112	-	-	-	-	-	-	-	-	-	-	-	-	112
Contact extreme temperatures	56	2	-	-	-	2	-	-	-	-	-	-	2	52
Other accident types	231	9	-	-	-	-	1	1	-	-	-	-	-	221
Unclassified	49	-	-	-	-	-	-	-	-	-	-	-	-	49

Table 15- Unsafe Acts by Activity of Injured

Unsafe acts	Total number of accidents	Lifting, carrying, or placing	Using hand tools	Using powered tools	Walking	Stepping to or from equipment	Climbing to or from equipment	Running or jumping	Other activities	Unclassified; insufficient data
Total	9,061	2,059	1,531	1,041	485	227	208	47	157	3,306
Assuming unsafe positions, postures	1,124	165	170	31	147	75	53	10	13	460
Inattention to footing	703	117	33	7	134	68	39	6	5	294
On ground	250	85	1	1	66	26	3	3	3	62
On scaffolds or platforms	182	7	21	3	5	7	1	3	1	134
On floors	149	14	8	1	36	24	2	-	1	63
On stairways or ladders	76	5	-	-	17	5	33	-	-	16
On other surfaces	46	6	3	2	10	6	-	-	-	19
Inattention to surroundings	226	33	26	5	11	6	13	4	1	127
Exposure to moving objects	127	7	97	2	-	-	-	-	2	19
Other	68	8	14	17	2	1	1	-	5	20
Incorrect handling: unsafe use of equipment	480	148	205	37	2	-	-	-	4	84
Gripping objects insecurely	336	110	149	18	1	-	-	-	2	56
Taking wrong hold of objects	75	36	9	2	1	-	-	-	2	25
Other	69	2	47	17	-	-	-	-	-	3
Operating without authority; failure to secure or warn	204	21	27	6	2	-	-	-	6	142
Unsafe loading or placing	61	15	7	1	-	-	-	-	3	35
Other unsafe acts	80	16	3	17	1	-	1	16	9	17
Unclassified; insufficient data	7,112	1,694	1,119	949	333	152	154	21	122	2,568

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